

DTE ENERGY ADD - ON TO MPSCS



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September 19, 2016

DTE Energy
One Energy Plaza
Attn: Robert Letkiewicz
Detroit, Michigan

Dear Mr. Letkiewicz,

DTE Energy has been a long time partner with Motorola Solutions, Inc. ("Motorola") and we are looking forward to working with you to migrate your land mobile radio system to a 800MHz ASTRO P25 Digital Radio System, working off of the State of the Art, State of Michigan MPSCS Radio System .The Motorola project team has taken great care to quote a solution that will meet your needs, and will be proposing a robust system in partnership with MPSCS.

This proposal represents Motorola's best effort based upon information provided by DTE Energy and MPSCS. Nothing less than reliability can be accepted when considering that the customers and communities you serve rely on your power for their livelihood and safety. This same mindset must also apply to your radio console and LMR system. When demand is highest, your radio system and dispatch centers must operate to enable field personnel to respond in a timely and safe manner. Interoperability and employee safety are our mutual goals.

Motorola will make its engineering and services resources available to DTE Energy as required, reviewing this information and addressing any questions. It is our intent to ensure that DTE Energy is fully comfortable with the proposed solution and the plan to implement it. Should DTE Energy require any changes in the design or implementation plan, Motorola will work closely with your project team to make the needed modifications. Please also note the special system discount for contracting this system is for a contract by November 15, 2016, with commitment to allow us to ship by year end.

The price for this project is **\$7,760,417.80** which includes a purchase discount of \$3,101,000. This pricing is good until November 15, 2016 and is subject to the terms and conditions of the Motorola Communications System Agreement. The CSA is attached for your review, and has been approved by our legal team for use with this project, as was done with DTE in 2012. We will also be covering the MPSCS one time user fee for a total of \$178,750.

Motorola will be pleased to address any questions DTE Energy may have regarding the proposal. Please direct any questions to your Senior Account Manager, Kathi Russ, at (330) 495-2628.

Motorola appreciates your interest in our company, products, and services. We look forward to continuing our relationship and implementing this project with DTE Energy.

Sincerely,

Motorola Solutions, Inc.

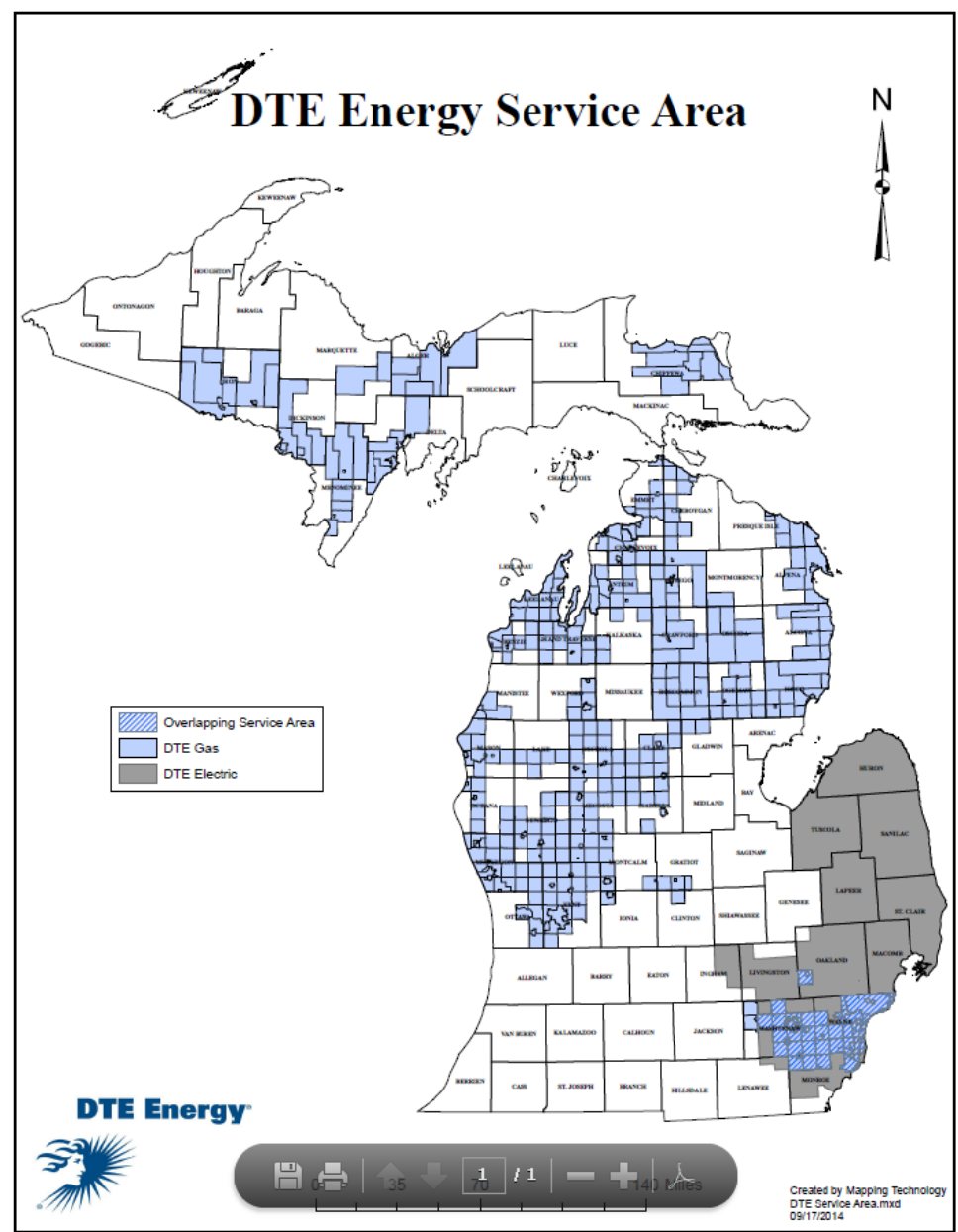
A handwritten signature in black ink that reads 'Kreg E. Christoff'.

Kreg E Christoff
MSSSI Vice President and Director

SYSTEM DESCRIPTION

1.1 ASTRO 25 DIGITAL TRUNKING SOLUTION

Motorola is committed to user-driven standards to support RF system interoperability within the Mission-Critical industry. Motorola is providing a firm proposal to DTE with robust, standards based (Project 25 compliance) MCC7500 Consoles at 4 DTE dispatch locations, additional 88 FDMA channels to existing 47 ASTRO® 25 voice only, digitally trunked ASR sites operating in 800 MHz frequency band and 1 channel add on to the existing 6 site St Clair circuit simulcast system that will tie to MPSCS 7.15 ASTRO25 M3 Core via existing link connectivity.



1.2 SYSTEM CONFIGURATION

ASTRO® 25 State System Add on

This State system add on offers DTE with a new IP based, modular console infrastructure including an advanced network of workstations, high-speed local area networks (LAN), sophisticated databases and software. The existing site(s) add on includes new repeaters, network/time reference modules, radio frequency (RF) equipments and subscribers as required. All proposed equipment is tested, validated, and certified to Motorola's rigorous performance specifications.

The proposed components for DTE ENERGY CO include the following:

Existing MPSCS 7.15 Master Site (M3 Core)

- Existing State M3 Core will have to include the following licenses for DTE channel and console Add-on:
 - Master site expansion (NM/ZC) License.
 - 2 Pack MCC7500 console License (10).
 - UNC additional device licenses.
 - 1000 Radio user licenses.

Console Site(s)

Total of 6 MCC 7500 IP Dispatch Consoles distributed across DTE chosen dispatch locations as shown below.

Location Name	Address	Op Count
GAS CONTROL DISPATCH MAIN	1 Energy Plaza, Detroit, MI 48226, USA	1
GAS CONTROL DISPATCH DISASTER RECOVERY	3920 E Michigan Ave, Ypsilanti, MI 48198, USA	1
SERVICE DISTRIBUTION DISPATCH	1 Energy Plaza, Detroit, MI 48226, USA	2
SERVICE DISTRIBUTION DISPATCH DISASTER RECOVERY	3690 Greenfield Rd, Melvindale, MI 48122, USA	2

Figure 1-1: MCC 7500 Dispatch Console Distribution across DTE locations

- Each Operator position at the above locations include the following:
 - Voice Processor Module.
 - Site LAN Switch.
 - Site Gateway.
 - MCC7500 Windows 7 Workstation & Dispatch Accessories.
 - Trunking and Advanced Conventional Operation Licenses.
 - Rack and Power distribution units.
 - DTE provided link between main and backup dispatch location.
 - DTE provided link between dispatch and MPSCS hop sites.

NOTE: Motorola Demarcation Point: Site Gateway/Backhaul Switch at each dispatch location.

Repeater Site

- 47 800 MHz existing ASR sites include 1-2 channels per DTE requirement which consists of the following:
 - 88 FDMA capable GTR 8000 base radios.
 - 88 ASTRO® 25 Site repeater software.
 - 29 TRAK 8835 Time reference module (sites that go beyond 7 or more channels).
 - 29 twenty four port Ethernet switch (sites that go beyond 7 or more channels).
 - 34 four channel Combiner with 34 Tx antenna assembly and interconnections.
 - Rack mount hardware.
 - 2 7.5” Open rack with Power distribution unit for Sites **1202** and **2504**.
 - 47 Flat Pack rectifier units.
- New Tx antenna system at 34 sites with the following:
 - MPSCS preferred 12dB gain Antenna.
 - 475’ 1 5/8” AVA Heliast.
 - Surge Suppression, Grounding, and Weatherproofing.
 - Connectors and Jumpers.

NOTE: Existing Rx side RF components and interconnections, site links to be reused.

Circuit Simulcast Site at St. Clair

- 6 800 MHz existing circuit based simulcast sites include 1channel per site (total of 6) which consists of the following:
 - 1 FDMA capable GTR 8000 base radios.
 - 1 future ready IP Simulcast Software.
 - 1 channel IP GCM8000 Comparator.
 - Rack mount hardware.
 - 1 7.5” Open rack with Power distribution unit for 6 sites.
 - 1 Flat Pack rectifier units.

NOTE: Existing Tx and Rx side RF components and interconnections to be reused. SRU cards at channel bank can support up to 10th channel. DTE's addition will be the 10th channel.

MCC 7500 Console

The system proposed includes 6 MCC 7500 console with Basic Console functionality, trunking and advanced conventional operation licenses.

The MCC 7500 Dispatch Console Operator Position includes a commercially available personal computer with Motorola-provided hardware and software.

The Motorola-provided hardware for the console position includes:

- Motorola Certified Personal Computer.
- Voice Processor Module (VPM).
- MCC Series Desktop Speakers.
- MCC Series Desktop Gooseneck Microphone.

- Footswitch.
- Dual Headset Jacks.
- Instant Recall Recorder (IRR).
- 19" Console Monitor.

NOTE: Archive Interface Server (AIS) included to interface DTE provided IP logger (if any) with MCC 7500.

The figure below shows the typical components of a Dispatch position:



Figure 1-2: MCC 7500 Dispatch Console, including desktop PC, headset, speakers, display, keyboard, mouse, microphone, and voice processor module

1.2.1 MCC 7500 Generic Console Capability

Type of Equipment	MCC7500 Features
Systems Supported	
APCO Project 25 Trunking	Yes Wire line to Trunking Controller Wireless via ACIM Link to ASTRO Console
SN/SZ Trunking	Yes Wire line to Trunking Controller (Requires SmartX) Wireless via ACIM Link to ASTRO Console
APCO Project 25 Digital Conventional	Yes Wire line via V.24 to Station/Comparator Wire line via IP to Station/Comparator Wireless via ACIM Link to ASTRO Console
Stat-Alert (MDC1200)	Yes
Advanced Securenet™	Yes

Type of Equipment	MCC7500 Features
Station Control Protocols	
ACIM Link Interface (DIU and Consolettes)	Yes (Consolettes only, doesn't support DIU)
Mixed-Mode Analog/Digital	Yes
Tone Remote Control (TRC)	Yes
TRC with Positive Mode Control (Dual Function Tones)	Yes
E&M Control	Yes
ASTRO 25 IP Digital Control	Yes
Aliasing for PTT IDs	Yes
General Transmit	Yes
Instant Transmit	Yes
APB Transmit	Yes
Type of Equipment	MCC7500 Features
Console Functionality	
Select/Unselect	Yes
MultiSelect	Yes
Patch - Radio to Radio	Yes
Patch - Telephone to Radio	Yes
Telephony	Yes
Alert Tones	Yes Configurable
Channel Marker Tones	Yes
DTMF and KNOX Tones	Yes
Sequential Paging	Yes
Simultaneous Paging	Yes
Per-Channel Volume Controls	Yes
All Mute	Yes
Acoustic Cross Mute	Yes
RF Cross Mute	Yes
RF Cross Busy	Yes
Intercom	Selective Op Intercom
VU Meter	Yes
Aux I/Os	Yes
External Paging Encoder Port	Yes
Instant Recall Recorder (IRR)	Yes Via 3rd party application
Op Logging Port	Yes
NENA Radio/Telephone Headset Interface Port (Sharing headset between radio & telephone)	Yes
Graphical User Interface (GUI)	Yes

GUI Localization Capability	Yes
API & SDK for 3rd Party Software Developers	Yes
Run Standalone on Laptop	No, requires VPM
Operating System	Windows 7 Professional SP1 (64 Bit)
Dispatch Positions	Up to 50 in M1 and M2 Core
Channels	Up to 160 assigned on an Op
Simultaneous Audio Streams (per Op)	Up to 60
Alert Tones (per Op)	Up to 15 (.wav file based)
Patches (per Op)	Up to 16
Type of Equipment	MCC7500 Features
Capacities and Accessories	
Multi-Selects (per Op)	Up to 16
Speakers (per Op)	Up to 8 Desktop Public Safety Grade
Microphone (per Op)	Up to 1 Gooseneck Public Safety Grade
Headsets (per Op)	Up to 2 PJ7 (6 wire) / PJ327 (4 wire) Public Safety Grade
Footswitch (per Op)	Up to 1 Dual Pedal Public Safety Grade

1.2.2 Elements of MCC 7500

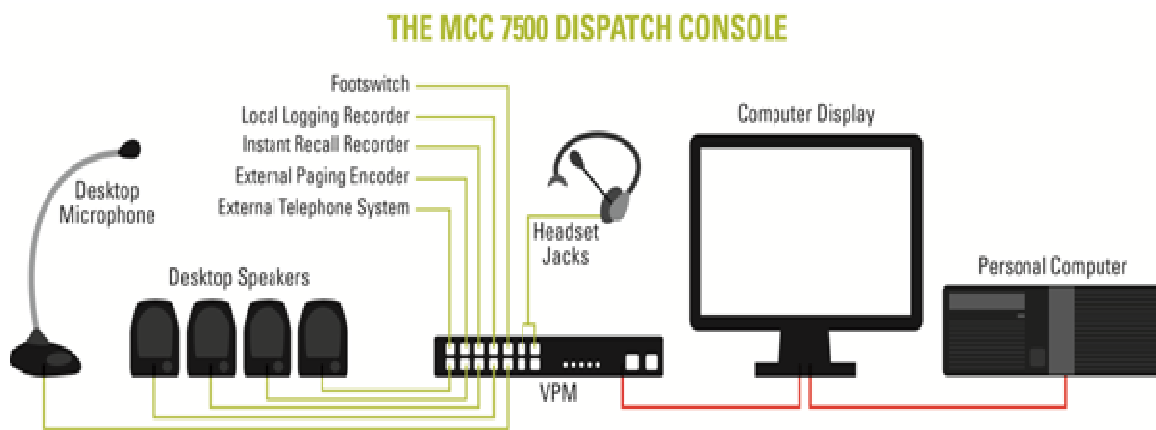


Figure 1-3: MCC 7500 Dispatch Console Components

Each MCC 7500 Dispatch Consoles includes the following elements:

Personal Computer (PC)

The personal computer for console position shall run Microsoft Windows 7, and it is required to have the customer provided PC configured by Motorola to ensure that the dispatch software, voice cards, and secure cards are properly installed and setup.

Computer Display

Any 19"-23" computer display shall be connected to MCC 7500 dispatch console.

Headset Jack

The dispatch console supports two headset jacks, both push-to-talk (PTT) and non-PTT-enabled for simultaneous use by the dispatch operator and a supervisor. The headset jack contains two volume controls for the separate adjustment of received radio and telephone audio.

Headset

The headsets consists of two elements. The headset base includes an audio amplifier, a push-to-talk switch, and a long cord that connects with the dispatch console. The headset top consists of the earpiece and microphone, as well as a short cable that connects to the headset base. The NC headsets are opted to be provided by DTE.

Gooseneck Microphone

The microphone controls the dispatch console's general transmit and monitor features through two buttons on its base. The microphone can be fastened down or left loose. It can be used alone or in conjunction with a headset.

Voice Processor Module (VPM)

The secure VPM provides vocoding and audio processing for the dispatch console, and also serves as the hub for the console's speakers, microphone, footswitch, headset jacks, and recorders.

Headset Port

The telephone/headset port allows the connection of an external telephone to the dispatch console, allowing the operator to use a single headset to communicate on both the radio system and a telephone system

Desktop Speakers

Two audio speakers have been included with each console position and can be configured to transmit audio from a specific talkgroup or set of talkgroups. Each speaker is a self-contained unit, with individual volume controls and can be placed on a desktop, or mounted on a rack or computer display.

Instant Recall Recorder (IRR) Port

The IRR port enables the connection of a short-term audio recorder, which allows the recording and playback of recent audio received by the cons.

Features and Benefits

Table 1-1: Benefits of MCC 7500 Console to DTE

Feature	Benefit to DTE ENERGY COMPANY
Tight coordination between the IP network and IP Console eliminates the potential for audio degradation.	Subscribers and Console operators will be able to communicate without loss of information.
Emergency calls are prioritized for successful delivery regardless of network traffic.	Console operators will always be able to hear emergency calls from users in the field
Inherent access to all system resources within the network provides dispatch priority to reach any user when needed.	Console operators will always be able to reach out to users in the field.
Rapid call set up times and quality of service, regardless of the size of the system.	The ability to scale the system to handle future capacity, while maintaining efficient dispatch operations.
True end-to-end encryption capable from the subscriber to the Console operator position, enhancing operational security	Assurance that sensitive, private communications will remain secure, from the user in the field to the Console dispatch operator
Improved bandwidth efficiencies reduce transport costs.	Ongoing cost savings for DTE ENERGY CO.

Dispatch Interface

The MCC 7500's graphical user interface (GUI) optimizes user efficiency. It is designed to display the maximum number of resources a dispatch operator is able to easily view and control. DTE ENERGY CO can customize the MCC 7500's GUI by agency or by individual user to meet their dynamic needs and requirements.

An example of the MCC 7500's GUI is shown in the below figure.

Based on the operator preference, the MCC 7500 GUI can be customized to show details of trunked and Conventional channels on a per-channel basis. Various controls can be highlighted, such as patch status, frequency select, coded/clear select, and individual volume control. Per-channel controls can be fully or partially shown, or hidden to save space on the screen. Busy dispatch operators can respond to a missed call by simply clicking on an entry in the Activity Log. The number of calls and call information displayed in the Activity Log is customizable to suit the needs of the user. The status of auxiliary inputs and outputs can be conveniently interpreted from the GUI with the use of familiar graphical icons, such as a door shown open or closed.



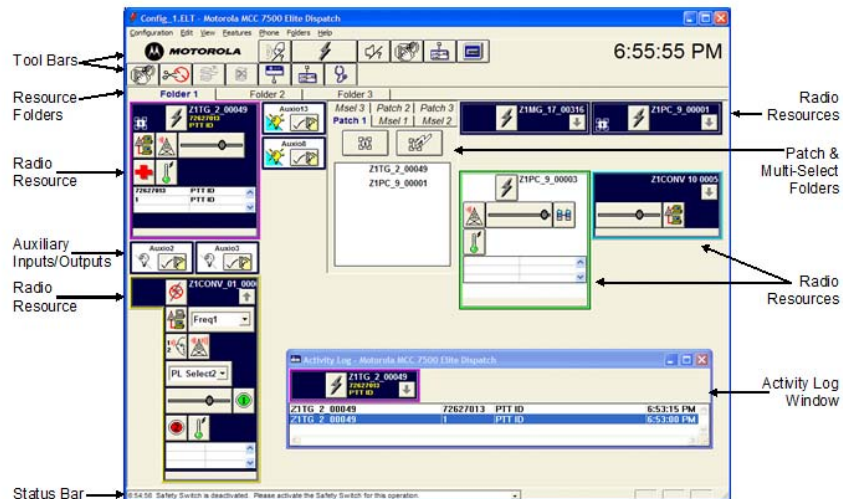


Figure 1-4: MCC 7500 Graphical User Interface

APX Series Subscriber Units

The APX P25 two-way radio series redefines safety in communication. APX puts the right device into the hands of the right user. Every feature and function is designed with its users in mind – from the rugged, easy to operate design to the loudest, clearest audio. The result is the ability to keep your people and community safer than ever before. The subscribers can be re-programmed with optional over-the-air with the POP25 data functionality proposed without disrupting voice communications.

The APX 4000 delivers all the benefits of P25 technology in the smallest P25 Phase 2 portable in the industry. Easy to use, tough as nails, a hard value to beat, it connects public works, utilities and rural public safety users to first responders for fast, interoperable communications. This unit is durable enough to withstand dust, heat, shock, and submersion.

The APX 4500 brings together powerful technology in a compact, rugged, mobile radio that's easy on your budget. It seamlessly unifies public works, utility, rural public safety and transportation users to first responders so they can communicate effectively in the moments that matter. A simplified dash mount design makes installation quick and easy.

The proposed solution includes the following subscribers:

- **25 APX 4000, Model 2**
 - 800 MHz FDMA Trunking Operation.
 - Two-Knob Configuration on Top.
 - Noise Cancelling Remote Speaker Mic.
 - Single Unit Portable Chargers.
 - Standard Battery.
 - Standard Antenna.
 - Standard Belt Clip.
 - 3 Years of Warranty.
 - Customer Programming Software and Data cable.

- **300 APX 4500 Mobiles with O2 Control Head at SE Michigan**, including:
 - 800 MHz FDMA Trunking Operation.
 - Dash-Mount O2 Control Head.
 - 800 MHz 3 dB gain Antenna
 - Mobile Palm Microphone.
 - Water-Resistant 15W Speaker.
 - 3 Years of Warranty.
 - Data cable.
- **10 APX 6500 Control Stations with O2 Control Head at TBD Location** including:
 - 800 MHz FDMA Trunking Operation.
 - Dash-Mount O2 Control Head.
 - 800 MHz 6 dB gain Antenna.
 - Control Station Desk Mic.
 - Control station Operation.
 - No Speaker.
 - Mobile Desk Tray with Power supply.
 - 3 Years of Warranty.
 - Customer programming Software.

NOTE: No Control Station combiner or Antenna interconnections, racks included for APX6500 control stations as the distribution of the subscribers is yet to be decided.



Figure 1-5: APX4500 Portable Model 2



Figure 1-6: APX4500 Mobile Unit



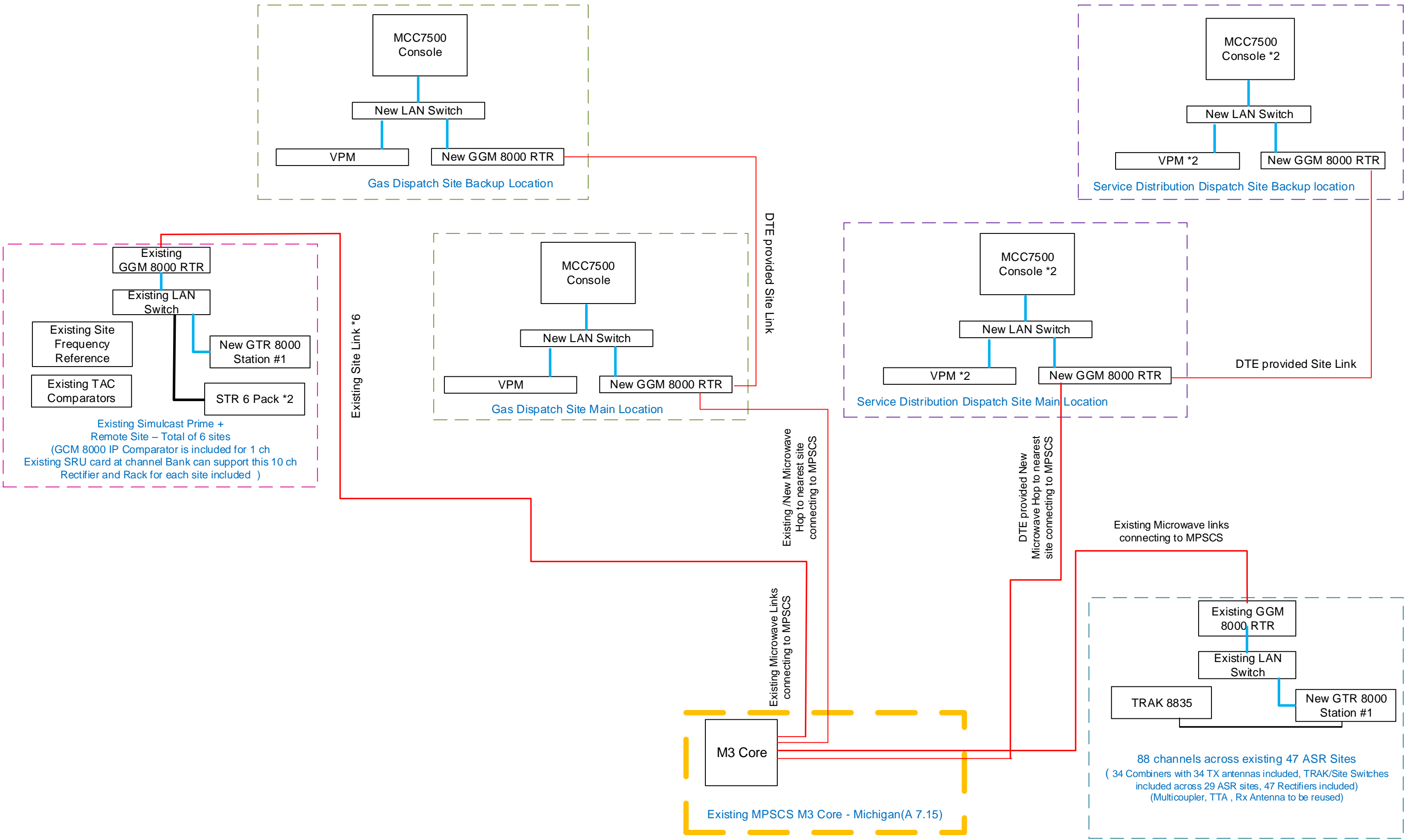
Figure 1-7: APX6500 Control Station

1.3 PROPOSED SYSTEM DIAGRAM

Our proposed System Diagram follows this page.



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DTE ENERGY CO. ASTRO25 STATE SYSTEM ADD ON – OVERVIEW DIAGRAM



Wire Legend

—	CUSTOMER PROVIDED / EXISTING LINK
—	LAN CONNECTION

<div>MOTOROLA</div>				
PROJECT: DTE Energy Co , Michigan 				
TITLE: ASTRO 25 System Add on				
CONTRACT	ENGINEER: Kalpana	PROGRAM MGR	SCALE: NONE	SIZE
PROGRAM	DRAWN	CHECKED	SHEET	REV: A
FILE	DATE: 9/14/2016	CODE IDENT	DWG NO	

1.4 SPECTRUM ALLOCATION PLAN

Our Allocation Plan follows this page.



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	BUSINESS BAND
	SPRINT VACATED
	PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
1	1: 4 port 2: 4 port	2	854.7625	#1				Y	6201	854.0125	1
2			855.0125	#2				Y	6202	854.0375	2
1								N	6206	854.0625	3
2								N	6504	854.0875	4
1								N	6506	854.1125	5
2								N	6508	854.1375	6
1	1: 6 port	2	854.7875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1			Y	6602	854.1625	7
1			855.0625	#1				Y	6606	854.1875	8
1								N	7202	854.2125	9
1								Y	7203	854.2625	10
1								Y	7204	854.2875	11
1								Y	7205	854.3125	12
1	1: 4 port	2	854.8125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1			Y	7206	854.4125	13
1			855.1125	#1				N	7302	854.4625	14
2								Y	7304	854.5875	15
1								Y	7308	854.6375	16
1								Y	7605	855.2625	17
1								Y	7809	856.3625	18
3	1: 6 Port 2: 4 port 3: 6 port	1	854.8625	#2	Doesn't require a new combiner if DTE goes first			Y	7901	855.6625	19
1								Y	7904	859.3625	20
3								N	7603	854.6875	21
3								Y	7504	854.7375	22
2											
1											
3								15		14 new combiners at sites that doesn't collide with DTE	
1											
2											
3											
3											
1								26 NEW FOR ASR SITES			
2	1: 6 port 2: 6 port 3: 700 Mhz	2	855.2125	#1	Doesn't require a new combiner if DTE goes first						
1			855.3875	#1							
2									5704	855.3625	1
1									8001	855.6125	2
3									8203	855.6875	3
3									8205	855.8625	4
1	1: 6 port 2: 4 port 3: 4 port	2	855.2625	#1	Doesn't require a new combiner if DTE goes first				8207	855.8875	5
3			855.5125	#1					8208	855.9125	6
1									8301	855.9375	7
3									8303	856.0875	8
1									8405	856.1125	9
2									8801	856.1375	10
3									8802	856.1625	11
1									9106	856.1875	12
3											
3											
2											
3											

	BUSINESS BAND
	SPRINT VACATED
	PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
3	1: 6 port 2: 700 Mhz	2									
2											
1											
1											
1			855.2875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			855.5375	#1							
1											
2											
1											
2	1: 4 port 2: 6 port	2									
1			855.3125	#2	Doesn't require a new combiner if DTE goes first						
1			855.5875	#2							
1											
2											
2											
2											
1	1: 4 port 2: 6 port	2									
2			855.3375	#1	Doesn't require a new combiner if DTE goes first						
1			855.6375	#2							
1											
2											
2											
2											
1	1: 6 port	2									
1			855.6625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			855.8375	#1							
1											
1											
1											
1											
1	1: 6 port	2									
1			855.7625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			856.2875	#1							
1											
1											
1											
1											
1	1: 6 port	2									
1			856.3625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			856.8125	#1							
1											
1											
2											
1											
2	1: 4 port 2: 4 port	2									
2			856.3875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			856.8625	#1							
1											
1											
2											
2											

12 NEW COMBINERS REQUIRED FOR SEMCO IF IT GOES SECOND; ELSE SEMCO FOR ASR SITES

	BUSINESS BAND
	SPRINT VACATED
	PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
1	1: 4 port 2: 4 port	2	856.4375	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
2			857.3125	#1							
1											
1											
2											
2											
1	1: 4 port 2: 4 port	2	857.8625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
2			858.3125	#1							
1											
2											
1											
2											
1	1: 6 port	2	857.8875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			858.3625	#1							
1											
1											
1	1: 6 port	2	858.4125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1	854.5125		Requires a new combiner irrespective of who goes first			
1			859.8625	#1							
1											
1											
1											
1											
1	1: 6 port	2	859.3625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1			859.9125	#1							
1											
1											
1	1: 6 port	2	855.2125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1	854.6625		Doesn't require a new combiner if first			
1			855.3875	#1							
2											
2											
1											
2											
2	1: 4 port 2: 6 port 3: 700 MHz	1	854.8625	#1	Doesn't require a new combiner if DTE goes first						
1											
2											
1											
3											
2											
1	1: 4 port 2: 2 port	2	855.2125	#2	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #2						
2			855.3875	#2							
1											
2											

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
1											
1	1: 4 port					854.7125	Requires a new combiner by default				
1							irrespective of who goes first				
1											
1			2	855.2625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1				855.5125	#1						
1	1: 4 port 2: 4 port										
1			2	855.2875	#2	Doesn't require a new combiner if DTE goes first					
1				855.5375	#2						
2											
2											
1	1: 4 port										
1			2	855.3125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1				855.5875	#1						
1											
1											
1	1: 4 port										
1			2	855.3375	#1	Requires a new combiner by default unless MPSCS agrees to add additional					
1				855.6375	#1						
1						2 ports combiner #1	854.8625	Doesn't require a new combiner if first			
2											
1	1: 4 port 2: 4 port										
1			2	855.6625	#2	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #2					
2				855.8375	#2						
1											
1											
2	1: 6 port										
1			2	855.7625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1				856.2875	#1						
1											
1											
1	1: 4 port 2: 4 port										
1			2	856.3625	#2	Doesn't require a new combiner if DTE goes first					
1				856.8125	#2						
2											
2											
1	1: 4 port										
1			2	856.3875	#1	Requires a new combiner by default unless MPSCS agrees to add additional					
1				856.8625	#1						
1						2 ports combiner #1	854.8875	Doesn't require a new combiner if first			
2											
1	1: 4 port 2: 4 port										
1			2	856.4375	#2	Doesn't require a new combiner if DTE goes					

BUSINESS BAND
SPRINT VACATED
PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition			Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner					
1			857.3125	#2	first					
1										
2										
1										
1										
1	1: 4 port	2	857.8625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1			858.3125	#1						
1										
1										
1	1: 4 port	2	857.8875	#2	Doesn't require a new combiner if DTE goes first					
1	2: 4 port		858.3625	#2						
2										
2										
1										
2										
1	1: 4 port	2	858.4125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
2	2: 4 port		859.8625	#1						
1										
2										
2										
1										
1										
2										
1	1: 6 port	2	859.3625	#2	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #2					
1	2: 4 port		859.9125	#2						
2										
1										
2										
2										
1										
1										
1	1: 6 port	2	854.7625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1			855.0125	#1						
1										
2						856.0125	Doesn't require a new combiner if first			
1										
1	1: 4 port	2	854.7875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
2	1: 4 port		855.0625	#1						
2										
1										
2										
1										
1	1: 6 port	2	854.8125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1					
1			855.1125	#1						
1										
1										
1										
2						854.9125	Doesn't require a new combiner if first			

BUSINESS BAND
SPRINT VACATED
PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List

On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
1	1: 4 port	2	857.8625	#1	Doesn't require a new combiner if DTE goes first						
2	2: 4 port		858.3125	#2							
1											
2											
1	1: 4 port	2	854.2375	#1	Requires a new combiner by default unless MPSCS agrees to add additional	856.0625	Requires a new combiner				
1				#1							
1			854.4375	#1							
1											
1	1: 4 port	2	854.3375	#1	Requires a new combiner by default unless MPSCS agrees to add additional	854.9375	Requires a new combiner				
1				#1							
1			854.5375	#1							
1											
1	1: 6 port	2	854.3625	#1	Requires a new combiner by default unless MPSCS agrees to add additional	855.1125	Doesn't require a new combiner if first				
1				#1							
1			854.6125	#1							
1											
2	1: 4 port 1: 4port	2	854.3625	#1	Requires a new combiner by default unless MPSCS agrees to add additional						
1				#1							
2			854.5625	#1							
2											
1	1: 4 port 2: 4 port	1	854.8625	#1	Doesn't require a new combiner if DTE goes first						
2											
1											
2											
1	1: 4 port	2	854.3875	#1	Requires a new combiner by default unless MPSCS agrees to add additional						
1				#1							
			854.6125								
	STR3000 Cabinets 1: 6 port 2: 6 port		854.4875					855.1875			
								855.4125			
1											
1											

SEMCO

Add 2 port expansion to #2 Combiner

#2 Combiner

#2 Combiner

Add 2 port expansion to #1 Combiner

#1 Combiner

855.4375

	BUSINESS BAND
	SPRINT VACATED
	PUBLIC SAFETY (NOT USED)

Wolverine GOS and Channel List					
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On Which?	Existing Combiners	DTE add-on Frequency list and Combiner layout and addition				Shared TX with Wolverine	Add to what Combiner	New Combiner Req (Y/N)	Site Alias	Tx	count of sites
		Number of Freqs to be	Add Freq	Add to what Combiner	Ports Added to Combiner						
1	1: 4 port	1	854.7625	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1											
1											
1											
1	1: 4 port	1	855.0125	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1											
1											
1											
1	1: 4 port	1	854.7875	#1	Requires a new combiner by default unless MPSCS agrees to add additional 2 ports combiner #1						
1											
1											
1											

Add 2 port expansion to #1
#1 Combiner Combiner

855.1625

STATEMENT OF WORK

2.1 OVERVIEW

This Statement of Work (SOW) describes the deliverables to be furnished to DTE Energy (DTE). The tasks described herein will be performed by Motorola Solutions Inc. (Motorola), its subcontractors, and DTE to implement the solution described in the System Description. It describes the actual work involved in installation, identifies the installation standards to be followed, and clarifies the responsibilities for both Motorola and DTE during the project implementation.

Specifically, this SOW provides:

- Project management approach to be used for the DTE Add-on MPSCS radio system project.
- A summary of the phases and tasks to be completed within the project lifecycle.
- A list of the deliverables associated with the project.
- A description of the responsibilities for both Motorola and DTE.
- The qualifications and assumptions taken into consideration during the development of this project.

This SOW provides the most current understanding of the work required by both parties to ensure a successful project implementation. In particular, Motorola has made assumptions of the sites to be used for the system add-on. Should any of the sites change, a revision to the SOW and associated pricing may be required. It is understood that this SOW is a working document, and that it will be revised as needed to incorporate any changes associated with contract negotiations, Contract Design Review (CDR), and any other change orders that may occur during the execution of the project.

2.1.1 Project Scope

This project will deploy equipment needed for DTE Energy to join the MPSPS System, with additions of GTR 8000 Station equipment at existing MPSCS sites, MCC 7500 Console Equipment at DTE Energy Sites, and associated equipment as fully described in the System Description section of this proposal.

2.2 ASSUMPTIONS AND GENERAL CONSIDERATIONS

Motorola has based the system design on information provided by DTE MPSCS, and an analysis of your system requirements. All assumptions are listed below for review. Should DTE or MPSCS deem Motorola's assumptions incorrect or not agreeable to, a revised proposal with the necessary changes and adjusted costs may be required. Changes to the equipment or scope of the project after contract may require a change order.

- Approved FCC licensing will be provided by DTE Energy.
- All existing sites or equipment locations will have sufficient space available for the system described.
- All existing sites or equipment locations will have adequate primary electrical power and site grounding suitable to support the requirements of the system described. This proposal has made accommodation for DC power and additional battery power required for station additions.



- All existing remote sites have adequate rack space to accommodate the station additions proposed.
- This proposal does not include an IP based voice logging solution. An AIS server is included to accommodate connection to an existing DTE Logger. This proposal assumes that if a digital voice logger is required, that it already exists or will be provided by others.
- No encryption capability has been provided with this proposal.
- MPSCS will provide access to the sites as necessary.
- Approved local, State, or Federal permits as may be required for the installation and operation of the proposed equipment, are the responsibility of DTE Energy.
- Any required system interconnections not specifically outlined here will be provided by DTE Energy, including but not limited to dedicated phone circuits or microwave links.
- Where necessary, DTE Energy will provide a dedicated delivery point—such as a warehouse—for receipt, inventory, and storage of equipment prior to delivery to the sites.
- DTE will be responsible for providing site links between dispatch sites and ASR sites. ASR sites have existing site links back to MPSCS Core site. DTE and MPSCS to work on making sure there is sufficient capacity to carry the voice traffic between these sites. As of now Motorola demarcation point is the backhaul switches, Site gateways at each of the dispatch sites.
- All the equipment quoted is AC powered. There is a combination of AC and DC sites (though most are DC). Motorola has included the cost to make DC cables for each of the stations at ASR and Simulcast Sites. TRAK unit will utilize the existing DC source at the sites.
- The existing simulcast site is a circuit based system with STR 6 Pack and ASTRO TAC comparators. Since ASTRO TAC comparators cannot be ordered right now, we have included GTR 8000s with IP Simulcast option, GCM Comparator as a placeholder for IP upgrade. Existing Channel banks, networking equipment, TRAK, combiner, Multicoupler, antenna assembly to be reused for DTE. Each Simulcast site has 1 rack included by default.
- AIS is included to interface MCC7500 console to an existing IP logger. No Logger pricing is included in this proposal.
- Please refer to the combiner count excel sheet that was generated based on MPSCS system matrix which is assumed to be current. Based on that+ new channel addition for DTE- 34 combiners with state preferred TX antenna assembly is included for 34 sites. There are a total of 47 ASR sites.
- 47 ASR sites will be accommodated with requested channels (combination of 1 or 2), making 88 standalone stations with ASTRO25 Repeater site software (FDMA only). Each site gets a flat pack rectifier as power calculation was not conducted to check if existing flat packs can handle the new additions.
- Equipment racks are provided for 2 sites. Per the MPSCS review only 2 sites show a requirement for equipment racks (1202, 2504).
- 4 dispatch locations (Gas main/backup, service main/backup) include 1 op MCC7500 @ Gas locations and 2 at service locations.
- Console site licenses, 1000 Radio user licenses included to add on to MPSCS 7.15 core. No other additional licenses included.
- FDMA trunking, no data, standard configuration included.
- Control stations include individual antennas- no control station combiners included as location is yet to be determined.
- All work is to be performed during normal work hours, Monday through Friday 8:00 a.m. to 5:00 p.m.
- No coverage guarantee (outdoor or in-building) is part of this proposal.
- Traffic loading for data and voice has not been analyzed for the respective sites, and the system design is assumed to be adequate in this regard.
- Any building coring needed for transmission lines is not included.



- All connectivity will be in good working condition, prior to installation.
- Motorola will make every effort to minimize but will not be responsible for any external interference, nor for interference between the Motorola-provided equipment and other DTE equipment. Should the system experience interference, Motorola can be contracted to investigate the source and recommend solutions to mitigate the issue.
- If for any reason, DTE or MPSCS requires specific subcontractors to be used on this project, other than Motorola approved or certified subcontractors. This may result in an additional cost change order.
- No prevailing wage, certified payroll, mandatory union workers or mandatory minority workers are required for this work.
- Motorola has included tower stress/structural analyses for existing MPSCS sites. No cost has been included in this proposal for tower structure remediation or enhancements that may be recommended. DTE Energy is responsible for tower upgrades as required.

2.3 CONTRACT

2.3.1 Contract Award (Milestone)

- DTE and Motorola execute the contract and both parties receive all the necessary documentation.

2.3.2 Contract Administration

Motorola Responsibilities

- Assign a Project Manager as the single point of contact with authority to make project decisions.
- Assign resources necessary for project implementation.
- Set up the project in the Motorola information system.
- Schedule the project kickoff meeting with **DTE** .

DTE Responsibilities

- Assign a Project Manager, as the single point of contact responsible for **DTE** -signed approvals.
- Assign other resources necessary to ensure completion of project tasks for which DTE is responsible.

Completion Criteria

- Motorola internal processes have been set up for project management.
- Both Motorola and **DTE** have assigned all required resources.
- Project kickoff meeting is scheduled.

2.3.3 Project Kickoff

Motorola Responsibilities

- Conduct a project kickoff meeting during the CDR phase of the project.
- Ensure key project team participants attend the meeting.
- Introduce all project participants attending the meeting.
- Review the roles of the project participants to identify communication flows and decision-making authority between project participants.
- Review the overall project scope and objectives with **DTE** .

- Review the resource and scheduling requirements with **DTE** .
- Review the Project Schedule with **DTE** to address upcoming milestones and/or events.
- Review the teams' interactions (Motorola and **DTE**), meetings, reports, milestone acceptance, and **DTE** participation in particular phases.

DTE Responsibilities

- **DTE** key project team participants attend the meeting.
- Review Motorola and **DTE** responsibilities.

Completion Criteria

- Project kickoff meeting completed.
- The next action items are identified in the meeting notes.

2.4 CONTRACT DESIGN REVIEW

2.4.1 Review Contract Design

Motorola Responsibilities

- Meet with **DTE** project team.
- Review the operational requirements and the impact of those requirements on various equipment configurations.
- Review the System Design.
- Establish a defined baseline for the system design and identify any special product requirements and their impact on system implementation.
- Work with **DTE** to present technical design information to MPSCS for approvals to join the State system.
- Submit design documents to **DTE** and MPSCS for approval. These documents form the basis of the system that Motorola will manufacture, assemble, stage, and install.
- Review the Statement of Work.
- Review the Project Schedule.
- Prepare equipment layout plans for staging.
- Discuss the proposed Cutover Plan and methods to document a detailed procedure.
- Review the Acceptance Test Plans.
- Prepare Site Evaluation Report summarizing findings of above-described site evaluations.
- Finalize site acquisition and development plan:
 - Determine each site's ability to accommodate proposed equipment based upon physical capacity.
 - If applicable, test existing equipment with which Motorola equipment will interface.
- Work with **DTE** to identify radio interference between the new communication system and other existing radio systems.
- Provide minimum acceptable performance specifications for microwave, fiber, or copper links.
- Establish demarcation point to define the connection point between the Motorola-supplied equipment and **DTE** -supplied link(s) and external interfaces.

Restrictions

- Motorola assumes no liability or responsibility for inadequate frequency availability or frequency licensing issues.
- Motorola is not responsible for issues outside of its immediate control. Such issues include, but



are not restricted to, improper frequency coordination by others and non-compliant operation of other radios.

- Motorola is not responsible for co-channel interference due to errors in frequency coordination by APCO or any other unlisted frequencies, or the improper design, installation, or operation of systems installed or operated by others.
- If, for any reason, any of the proposed sites cannot be utilized due to reasons beyond Motorola's control, the costs associated with site changes or delays including, but not limited to, re-engineering, frequency re-licensing, site zoning, site permitting, schedule delays, site abnormalities, re-mobilization, etc., will be paid for by **DTE** and documented through the change order process.

DTE Responsibilities

- **DTE** key project team participants attend the meeting.
- DTE is responsible to coordinate, schedule, and attend approval meetings required by MPSCS. (Motorola will assist with presentation.)
- Make timely decisions in accordance with the Project Schedule.
- Frequency licensing and interference:
 - As mandated by FCC, **DTE**, as the licensee, has the ultimate responsibility for providing all required radio licensing or licensing modifications for the system prior to system staging. This responsibility includes paying for FCC licensing and frequency coordination fees.
 - Provide the FCC "call sign" station identifier for each site prior to system staging.

Completion Criteria

- Complete Design Documentation, which may include updated System Description, Equipment List, system drawings, or other documents applicable to the project.
- Incorporate any deviations from the proposed system into the contract documents accordingly.
- The system design is "frozen" in preparation for subsequent project phases such as Order Processing and Manufacturing.
- A Change Order is executed in accordance with all material changes resulting from the Design Review to the contract.

2.4.2 Design Approval (Milestone)

- **DTE** executes a Design Approval milestone document.

2.5 ORDER PROCESSING

2.5.1 Process Equipment List

Motorola Responsibilities

- Validate Equipment List by checking for valid model numbers, versions, compatible options to main equipment, and delivery data.
- Enter order into Motorola's Customer Order Fulfillment (COF) system.
- Create Ship Views and confirm accuracy of these with **DTE**. Ship Views are mailing labels that carry complete equipment shipping information. These labels direct the timing, method of shipment, and ship path to the specific predetermined secure destinations that the equipment will be shipped.

- Create equipment orders.
- Reconcile the Equipment List(s) to the Contract.
- Procure third-party equipment, if applicable.

DTE Responsibilities

- Approve shipping location(s) as provided on the Ship Views.

Completion Criteria

- The Equipment List has been verified that it contains the correct model numbers, version, options, and delivery data.
- Trial validation completed.
- The equipment order has been bridged to the manufacturing facility.

2.6 MANUFACTURING AND STAGING

2.6.1 Manufacture Motorola Fixed Network Equipment

Motorola Responsibilities

- Manufacture the Fixed Network Equipment (FNE) necessary for the system based on equipment order.

DTE Responsibilities

- None.

Completion Criteria

- FNE has been shipped to the appropriate location, i.e., the field or the staging facility.

2.6.2 Manufacture Motorola Subscribers

Motorola Responsibilities

- Manufacture the subscribers necessary for the system, based on equipment order and project schedule.
- Ship a representative sample of subscribers to staging facilities. (when applicable)

DTE Responsibilities

- None.

Completion Criteria

- Subscribers (mobile or portable radios) shipped to the field.

2.6.3 Manufacture Non-Motorola Equipment

Motorola Responsibilities

- Procure non-Motorola equipment necessary for the system based on equipment order.

DTE Responsibilities

- None.



Completion Criteria

- Ship non-Motorola manufactured equipment to the field and/or the staging facility.

2.6.4 Ship to Staging – Console Systems (Milestone)

Motorola Responsibilities

- Ship console equipment needed for staging to the Motorola Customer Center for Solutions Integration (CCSi) facility in Schaumburg, Illinois.

DTE Responsibilities

- None.

Completion Criteria

- All equipment needed for staging has been shipped to Motorola's CCSi facility in Schaumburg, Illinois.

2.6.5 Stage System

Motorola Responsibilities

- Set up and rack the console system equipment on a site-by-site basis, as it will be configured in the field at each of the transmitter/receiver sites.
- Cut and label cables according to the approved CDR documentation.
- Label the cables with to/from information to specify interconnection for field installation and future servicing needs.
- Complete the cabling/connecting of the subsystems to each other ("connectorization" of the subsystems).
- Assemble required subsystems to assure system functionality.
- Power up, program, and test all staged equipment.
- Confirm system configuration and software compatibility to the existing system.
- Load application parameters on all equipment according to input from Systems Engineering.
- Complete programming of the Fixed Network Equipment.
- Program the approved templates into a radio-programming template tool.
- Complete programming of sample Subscriber units.
- Inventory the equipment with serial numbers and installation references.
- Complete system documentation.
- Third party subsystems may be staged at the manufacturer's facilities and integrated in the field.
- Provide a Factory Acceptance Test Plan.

DTE Responsibilities

- Provide information on existing system interfaces as may be required.
- Provide information on room layouts or other information necessary for the assembly to meet field conditions.
- Review and approve proposed Factory Acceptance Test Plan.

Completion Criteria

- System staging completed and ready for testing.

2.6.6 Perform Staging Acceptance Test Procedures

Motorola Responsibilities

- Test and validate system software and features.
- Functional testing of standard system features.
- Conduct site and system level testing.
- Power-up site equipment and perform standardized functionality tests.
- Perform system burn-in 24 hours a day during staging to isolate and capture any defects.
- Perform Customer-witnessed tests based upon Factory Acceptance Test Plan (when required).

DTE Responsibilities

- Attend Factory Acceptance Testing (if required).
- Pay for travel, lodging, meals, and all incidental expenses for **DTE** personnel and representatives to witness the Factory Acceptance Testing.

Completion Criteria

- Approve Factory Acceptance Testing.

2.6.7 Ship Equipment to Field

Motorola Responsibilities

- Pack system for shipment to final destination.
- Arrange for shipment to the field.

DTE Responsibilities

- None.

Completion Criteria

- Equipment ready for shipment to the field.

2.6.8 Ship Acceptance (Milestone)

- All equipment shipped to the field.

2.7 FLEETMAP

2.7.1 Develop Fleetmap

Motorola Responsibilities

- Schedule required meeting(s) with the appropriate Customer representative(s)/agency(ies).
- Meet with **DTE** user groups.
- Provide details on the features and functionality of the Motorola equipment/system.
- Work with **DTE** and participating agency(ies) to develop and obtain approval of the fleetmap for the system.



- Program the infrastructure equipment, subscribers, terminals, and any other radio system FNE, based on fleetmap.
- Any changes requested by **DTE** , after approval of fleetmap and template definitions, will require updating the contract documents accordingly.
- Provide guidelines for development of fleetmap to customer on projects where subscriber units are being purchased/reprogrammed outside the scope of this project.

DTE Responsibilities

- Designate a representative for the user groups, to make timely decisions on their behalf.
- Identify **DTE** System Manager who will set up a “steering” committee consisting of various members from user groups.
- The System Manager, with the help of the steering committee, will be responsible for setting standardized system management and operational policies (SOP) that will apply to all users.
- A sample of SOP committee decisions includes:
 - User Access Management Protocol.
 - User Database Management Protocol.
 - System Security Protocol.
 - Subscriber Radio Standards.
- Configure, Manage, and Control the Fleetmap Database.
 - User group reviews its radio standard operational policies and then determines what modifications will be required, if any.
 - Create a “Console Dispatch and Radio Programming Policy” to decide how each Subscriber group will operate on the system and what features will be activated.
 - User group representative(s) makes Fleetmap programming decisions.
- Complete the initial fleet mapping process prior to staging of the system.

Completion Criteria:

- Fleetmap requirements completed and approved by **DTE** .

2.7.2 Develop Templates

Motorola Responsibilities

- Motorola assists **DTE** in defining each radio/console template. Up to four (4) templates are included.
- Motorola participates in a meeting to finalize any changes among user groups.
- Program the approved templates into a radio-programming template tool.
- Program sample radios with approved templates and deliver for **DTE** evaluation.

DTE Responsibilities

- User groups create templates in a spreadsheet format.
- Forward electronic copies of the spreadsheets to the committee members for their review and comment.
- Evaluate sample radios and provide feedback.
- Approve templates.

Completion Criteria

- Templates completed and approved by **DTE** .

2.8 CIVIL WORK FOR DTE -PROVIDED FACILITIES

Motorola Responsibilities

- Provide electrical requirements for each equipment rack to be installed in **DTE** or MPSCS provided facilities.
- Provide heat load for each equipment rack to be installed in **DTE** or MPSCS provided facilities.
- Extend customer provided electrical to Motorola equipment and terminate at the OP8 or Cabinet electric panel.
- Perform structural analysis of existing MPSCS towers at 34 sites requiring new antenna systems to confirm that the structure is capable of supporting proposed and future antenna loads. Deliver study results to DTE and MPSCS for action or approval to proceed.

DTE Responsibilities

- If applicable and based on local jurisdictional authority, **DTE** will be responsible for any installation or upgrades of the Critical Operation Power Systems in order to comply with NFPA 70, Article 708.
- Secure site lease/ownership, zoning, permits, regulatory approvals, easements, power, and Telco connections.
- Provide clear and stable access to the sites for transporting electronics and other materials.
 - Sufficient site access must be available for trucks to deliver materials under their own power and for personnel to move materials to the facility without assistance from special equipment.
- Supply adequately sized electrical service, backup power (UPS, generator, batteries, etc.) including the installation of conduit, circuit breakers, outlets, etc., at each equipment location.
- Provide adequate HVAC, grounding, lighting, cable routing, and surge protection (also, among existing and Motorola-provided equipment) based upon Motorola's **Standards and Guidelines for Communication Sites** (R56). Ceiling (minimum 9 feet) and cable tray heights (minimum 8 feet) in the equipment rooms in order to accommodate 7-foot, 6-inch equipment racks.
- Provide floor space and desk space for the system equipment at **DTE** -provided facilities. Each rack shall be provided a minimum of 24-inch x 24-inch footprint with 36-inch clearance in the front and back.
- Relocate existing equipment, if needed, to provide required space for the installation of Motorola-supplied equipment.
- Bring grounding system up to Motorola's R56 standards and supply a single point system ground, of 5 ohms or less, to be used on all FNE supplied under the Contract. Supply grounding tie point(s) within 10 feet from the Motorola-supplied equipment.
- Provide all necessary wall or roof penetrations on existing buildings for antenna coax and microwave waveguide (if applicable) for main transmitter antennas, microwave radios, and control station antennas.
- Provide obstruction-free area for the cable run between the demarcation point and the communications equipment.
- Resolve any environmental issues including, but not limited to, asbestos, structural integrity (rooftop, water tank, tower, etc.) of the site, and any other building risks. (Resolve environmental or hazardous material issues).
- Supply all permits as contractually required.
- Supply interior building cable trays, raceways, conduits, and wire supports.
- Complete all customer deliverables in accordance within the approved project schedule.
- Provide a single point ground system in the equipment room, terminated on a 4"x16" Master Ground Bar connected to the single point ground.



- Run an appropriate sized conductor from the equipment room Master Ground Bar to Dispatch and terminate it on a 4"x12" ground buss bar under the floor in Dispatch.
- Work with MPSCS to provide for any necessary tower site structural improvements needed to support the system as proposed.

Completion Criteria

- All sites are ready for equipment installations and in compliance with Motorola's R56 standards.

2.9 SYSTEM INSTALLATION

2.9.1 Install Fixed Network Equipment

Motorola Responsibilities

- Motorola will be responsible for the installation of all fixed equipment contained in the Equipment List and outlined in the System Description based on the mutually agreed upon floor plans at the sites where the physical facility improvement is complete and the site is ready for installation. All equipment will be properly secured to the floor and installed in a neat and professional manner, employing a standard of workmanship consistent with its own R56 installation standards and in compliance with applicable National Electrical Code (NEC), EIA, Federal Aviation Administration (FAA), and FCC standards and regulations.
- Motorola will furnish all cables for power, audio, control, and radio transmission to connect the Motorola supplied equipment to the power panels or receptacles and the audio/control line connection point during installation of the fixed equipment at the various sites.
- Motorola will bond the supplied equipment to the site ground system in accordance with Motorola's R56 standards.
- During field installation of the equipment, any required changes to the installation will be noted and included with the final 'as-built' documentation of the system.
- Motorola will furnish all cables to connect the Motorola supplied equipment to the demarcation points during installation of the fixed equipment at the various sites.
- Will not provide storage. Motorola will coordinate receipt of the Motorola-provided equipment at the customer-provided location with **DTE** designated contact. A location central to the sites.

DTE Responsibilities

- Provide secure storage for the Motorola-provided equipment, at a location central to the sites. Motorola coordinates the receipt of the equipment with **DTE** designated contact, and inventory all equipment.
- Provide access to the sites, as necessary.

Completion Criteria

- Fixed Network Equipment installation has been completed and is ready for optimization.

2.9.2 Fixed Network Equipment Installation Complete

- All fixed network equipment installed and accepted by **DTE** .

2.9.3 Console Installation

Motorola Responsibilities

- Install the console in the space provided by **DTE** .
- Connect **DTE** -supplied, previously-identified circuits into the console, to a demarcation point located within 25 feet of the console interface.
- Terminate the audio outputs for the logged talkgroups onto a punchblock, and then terminate these outputs into the logging recorder.
- Connect the appropriate equipment to **DTE** -supplied ground system (if provided by **DTE**) in accordance with Motorola's R56 Site Installation standards.
- Perform the console programming, based on the console templates designed during the fleet mapping process.
- For consoles not located at the master site, additional network link resources will be required, as identified in the network diagram provided by Motorola.

DTE Responsibilities

- Provide demarcation point located within 25 feet of the console interface.

Completion Criteria

- Console installation is complete.

2.9.4 Console Installation Complete

- Console installation completed and accepted by **DTE** .

2.9.5 Control Station Installation

Motorola Responsibilities

- Properly connectorize and ground the cabling, which will be run to the outdoor antenna location using the least obtrusive method.
- Protect the cabling by providing and installing a bulkhead lightning surge protector.
- Survey the exact mounting locations and develop control station installation plan.
- Perform the following tasks for the local control stations installations:
 - Create installation plan.
 - Assist **DTE** to determine the locations of control stations and desksets at each site.
 - Install RF local control stations identified in the equipment list.
 - Install line (not greater than 50 feet) and antenna system (connectors, coax grounding kit, antenna, and surge protection).
 - Connect to **DTE** -supplied ground point.
- Program all control stations once, from the template (approved by **DTE**) prior to delivery.

DTE Responsibilities

- Provide cable entry into the building through wall feed-through and seal with silicone, or provide an entry plate and boot.
- Provide ground point within 6 cable feet of the control station.
- Provide necessary space for installation of the local control station. Supply, exterior or internal, vertical spaces for installation of the control station antenna with no more than a 100-foot cable run.
- Provide an elevated antenna mounting location.



- Supply a dedicated 115 VAC grounded electrical outlet rated at 15 A to power the control station and remote control device. Provide an outlet within 6 feet of the unit.
- Supply a ground point of 5 ohms or less located in the immediate vicinity (within 6 feet) of the finalized location of the antenna and control station.
- Provide antenna-mounting facilities at each of the RF control station points specified, while providing an adequate means of feed-line routing and support.

Completion Criteria

- All control station installations are completed and have been approved by **DTE** .

2.9.6 System Installation Acceptance (Milestone)

- All equipment installations are completed and accepted by **DTE** .

2.10 SYSTEM OPTIMIZATION

2.10.1 Optimize System FNE

Motorola Responsibilities

- Motorola and its subcontractors optimize each subsystem.
- Verify that all equipment is operating properly and that all electrical and signal levels are set accurately.
- Verify that all audio and data levels are at factory settings.
- Check forward and reflected power for all radio equipment, after connection to the antenna systems, to verify that power is within tolerances.
- Check audio and data levels to verify factory settings.
- Verify communication interfaces between devices for proper operation.
- Test features and functionality are in accordance with manufacturers' specifications and ensure feature functionality is in compliance with the final configuration established during the CDR/system staging.
- Set up the consoles on the radio system to perform the dispatching operation.

DTE Responsibilities

- Provide access/escort to the sites.
- Provide required radio ID and alias information to enable alias database setup for interface to console. Dispatchers to use the existing conventional system icons for dispatching until cutover.

Completion Criteria

- System FNE optimization is complete.

2.10.2 Link Verification

Motorola Responsibilities

- Perform test to verify site link performance, prior to the interconnection of the Motorola-supplied equipment to the link equipment.

NOTE: 900 MHz, 2.4 GHz, and 5.2/5.4/5.8 GHz bands are unlicensed, therefore Motorola has no control over signal emissions in these bands that may interfere with the desired signals. Although link surveys will identify possible existing interference sources, there is no guarantee that interference will not emerge after the survey. Motorola can assist **DTE** in assessing interference issues if they occur, however, the cost for the services and any additional equipment necessary to resolve the interference problem are beyond the scope of the generic link survey and installation.

DTE Responsibilities

- Make the required links which meet the specifications supplied by Motorola at the CDR available.

Completion Criteria

- Link verification successfully completed.

2.10.3 Optimization Complete

- System optimization is completed. Motorola and DTE agree that the equipment is ready for acceptance testing.

2.11 TRAINING

2.11.1 Perform Training

Motorola Solutions Responsibilities

- Finalize training schedules purchased as part of this project with the DTE Project Manager.
- Conduct the training classes outlined in the Training Plan.

Customer Responsibilities

- Attend training classes.
- Comply with the pre-requisites in the Training Plan.

Completion Criteria

All training classes completed.

2.11.2 Training Complete

- All training classes completed.



2.12 AUDIT AND ACCEPTANCE TESTING

2.12.1 Perform R56 Installation Audit – DTE Dispatch Sites Only

Motorola Responsibilities

- Perform R56 site-installation quality audits, verifying proper physical installation and operational configurations.
- Create site evaluation report to verify site meets or exceeds requirements, as defined in Motorola's Standards and Guidelines for Communication Sites (R56).

DTE Responsibilities

- Provide access/escort to the sites.
- Witness tests (if desired).

Completion Criteria

- All R56 audits completed successfully.

2.12.2 Perform Equipment Testing

Motorola Responsibilities

- Test individual components of the system to verify compliance to the equipment specifications.
- Repeat any failed test(s) once Motorola (or **DTE**) has completed the corrective action(s).
- Prepare documentation of component tests to be delivered as part of the final documentation package.

DTE Responsibilities

- Witness tests if desired.

Completion Criteria

- Successful completion of equipment testing.

2.12.3 Perform Functional Testing

Motorola Responsibilities

- Verify the operational functionality and features of the individual subsystems and the system supplied by Motorola, as contracted.
- If any major task as contractually described fails, repeat that particular task after Motorola determines that corrective action has been taken.
- Document all issues that arise during the acceptance tests.
- Document the results of the acceptance tests and present to **DTE** for review.
- Resolve any minor task failures before Final System Acceptance.

DTE Responsibilities

- Witness the functional testing.

Completion Criteria

- Functional testing has been successfully completed.
- **DTE** has approved the successful completion of the functional testing.

2.12.4 System Acceptance Test Procedures (Milestone)

- **DTE** approves the completion of all the required tests.

2.13 SUBSCRIBER INSTALLATION

2.13.1 Program and Install Mobiles

Motorola Responsibilities

- Program test mobiles with each template version and activate them on the system.
- Pass all features and functionalities of the mobile template.
- Once all templates and client software is tested and approved by **DTE**, Motorola requests template acceptance sign-off.
- Program all the mobiles, as identified in the equipment list, in accordance with **DTE** -approved programming templates, client software, and fleetmap.
- Work with **DTE** to develop and approve prototypes for each type of mobile installation.
- Install all the mobiles in the vehicles, as identified in the equipment list, and according to the installation schedule.
- The following guidelines are followed during installation:
 - A “one-time only” programming charge is included in the project price.
 - Installations utilize the standard mobile mounting hardware provided with the type of unit.
 - Obtain main power leads from a voltage source as supplied in the mobiles.
 - Permanently mount the antennas on each vehicle according to the approved prototype, appropriate for the vehicle type. Install the antennas close to the same location as the existing antennas, where practical, in vehicles that already have antennas installed. Install the antennas on the roof, where practical, on the new antenna installations.
 - Motorola will determine an alternative location whenever the antennas cannot be installed on the roof.
 - Plug the old antenna hole with an appropriate rubber plug if the antenna requires a new location on the vehicle.

DTE Responsibilities

- Test and verify each feature selected during the CDR process.
- Approve successful testing of each feature by initialing each test shown on the test script.
- Provide adequate number of vehicles for installations according to the project/installation schedule.
- If any installations require variations from the approved plan, **DTE** must approve, before proceeding with the variance.

Completion Criteria

- All mobiles are programmed and installed successfully and approved by **DTE**.



2.13.2 Program and Distribute Portables

Motorola Responsibilities

- Program test portables with each template version and activate them on the system.
- Once all templates and client software are tested and approved by **DTE**, Motorola requests written approval of template acceptance.
- Program all the portables as identified in the equipment list based upon **DTE** approved programming templates, client software, and fleetmap. A “one-time only” programming is included in the project pricing.
- Deliver units to authorized **DTE** personnel and inventory upon receipt.

DTE Responsibilities

- Approve final template(s) and initiate portable programming.
- Upon receipt of portables, a Customer-authorized signatory acknowledges receipt of all portables and accessories and proper operation of a sampling of portables.
- Distribute the portables to end-users.

Completion Criteria

- All portables are successfully programmed and approved by **DTE**.

2.13.3 Subscribers Complete

- All Subscribers are programmed and/or distributed/installed successfully, and approved by **DTE**.

2.14 FINALIZE

2.14.1 Cutover

Motorola Responsibilities

- Motorola and **DTE** develop a mutually agreed upon cutover plan based upon discussions held during the CDR.
- During cutover, follow the written plan and implement the defined contingencies, as required.
- Conduct cutover meeting(s) with user group representatives to address both how to mitigate technical and communication problem impact to the users during cutover and during the general operation of the system.

DTE Responsibilities

- Coordinate any MPSCS personnel needed for project meetings.
- Attend cutover meetings and approve the cutover plan.
- Notify the user group(s) affected by the cutover (date and time).
- Conduct a roll call of all users working during the cutover, in an organized and methodical manner.
- Ensure that all Subscriber users are trained and the Subscribers have been activated on the system.
- Provide Motorola with the subscriber information for input into the system database, for activation.
- Ensure that all subscribers are operating on new system prior to old system being removed.
- DTE is responsible to decommission, remove, and dispose of legacy DTE radio equipment.

Completion Criteria

- Successful migration from the old system to the new system.

2.14.2 Resolve Punchlist

Motorola Responsibilities

- Work with **DTE** to resolve punchlist items, documented during the Acceptance Testing phase, in order to meet all the criteria for final system acceptance.

DTE Responsibilities

- Assist Motorola with resolution of identified punchlist items by providing support, such as access to the sites, equipment and system, and approval of the resolved punchlist item(s).

Completion Criteria

- All punchlist items resolved and approved by **DTE** .

2.14.3 Transition to Service/Project Transition Certificate

Motorola Responsibilities

- Review the items necessary for transitioning the project to warranty support and service.
- Provide a Customer Support Plan detailing the warranty and post-warranty support, if applicable, associated with the Contract equipment.

DTE Responsibilities

- Participate in the Transition Service/Project Transition Certificate (PTC) process.
- All service information has been delivered and approved by **DTE** .

2.14.4 Finalize Documentation

Motorola Responsibilities

Motorola's responsibilities are provided in Table 2-1.

Table 2-1: Project Final Documentation

Project Final Documentation
Item Description
Miscellaneous documents.
Accepted proposal with itemized pricing.
Contract Design Review Documents.
Equipment Lists and Invoice with all Serial Numbers.
Equipment Drawings including: <ul style="list-style-type: none">▪ Rack Footprint Drawings.▪ Rack Riser Drawings showing actual rack space and equipment layout.
Network Drawings.
IP Address Table.



Project Final Documentation
Site and System Block Drawings.
Site Hardware Components Manuals.
All Factory Staging Documentation including Factory Test Plan and Test Plan Results.
All acceptance test plans and completed signed results for all systems and equipment including but not limited to: <ul style="list-style-type: none"> - Functional Test Plan and Results. - Site Testing and Inspections Test Plan and Results
Milestone Certificates.
Customer Support Plan.

DTE Responsibilities

- Receive and approve all documentation provided by Motorola.

Completion Criteria

- All required documentation is provided and approved by **DTE** .

2.14.5 Final Acceptance (Milestone)

- All deliverables completed, as contractually required.
- Final System Acceptance received from **DTE** .

2.15 PROJECT ADMINISTRATION

2.15.1 Project Status Meetings

Motorola Responsibilities

- Motorola Project Manager or designee will attend all project status meetings with **DTE** as determined during the CDR.
- Record the meeting minutes and supply the report.
- The agenda will include the following:
 - Overall project status compared to the Project Schedule.
 - Product or service related issues that may affect the Project Schedule.
 - Status of the action items and the responsibilities associated with them, in accordance with the Project Schedule.
 - Any miscellaneous concerns of either **DTE** or Motorola.

DTE Responsibilities

- Attend meetings.
- Respond to issues in a timely manner.

Completion Criteria

- Completion of the meetings and submission of meeting minutes.

2.15.2 Progress Milestone Submittal

Motorola Responsibilities

- Submit progress (non-payment) milestone completion certificate/documentation.

DTE Responsibilities

- Approve milestone, which will signify confirmation of completion of the work associated with the scheduled task.

Completion Criteria

- DTE approval of the Milestone Completion document(s).

2.15.3 Project Schedule

Detailed project schedules are integral to the management of the project and will be produced by the Motorola team to provide a timeline analysis for all phases of the project. A preliminary project schedule has been included as part of this SOW. This schedule will be refined during the CDR phase of the project. The final project schedule will emphasize all milestones and the critical path, which is essential for the successful completion of the project. DTE and Motorola will mutually agree upon the final schedule.

The project schedule assumes no delays in securing any site access, or delays by DTE completing its responsibilities for this project. Any delays in work to be performed by DTE (e.g., site improvements) may impact the overall project schedule and may require a Change Order.

2.15.4 Change Order Process

Either Party may request changes within the general scope of this Agreement. If a requested change causes an increase or decrease in the cost, change in system configuration or adds time to the project's timeline required to perform this Agreement, the Parties will agree to an equitable adjustment of the Contract Price, Performance Schedule, or both, and will reflect the adjustment in a change order. Neither Party is obligated to perform requested changes unless both Parties execute a written change order.

2.15.4.1 Change Order Form

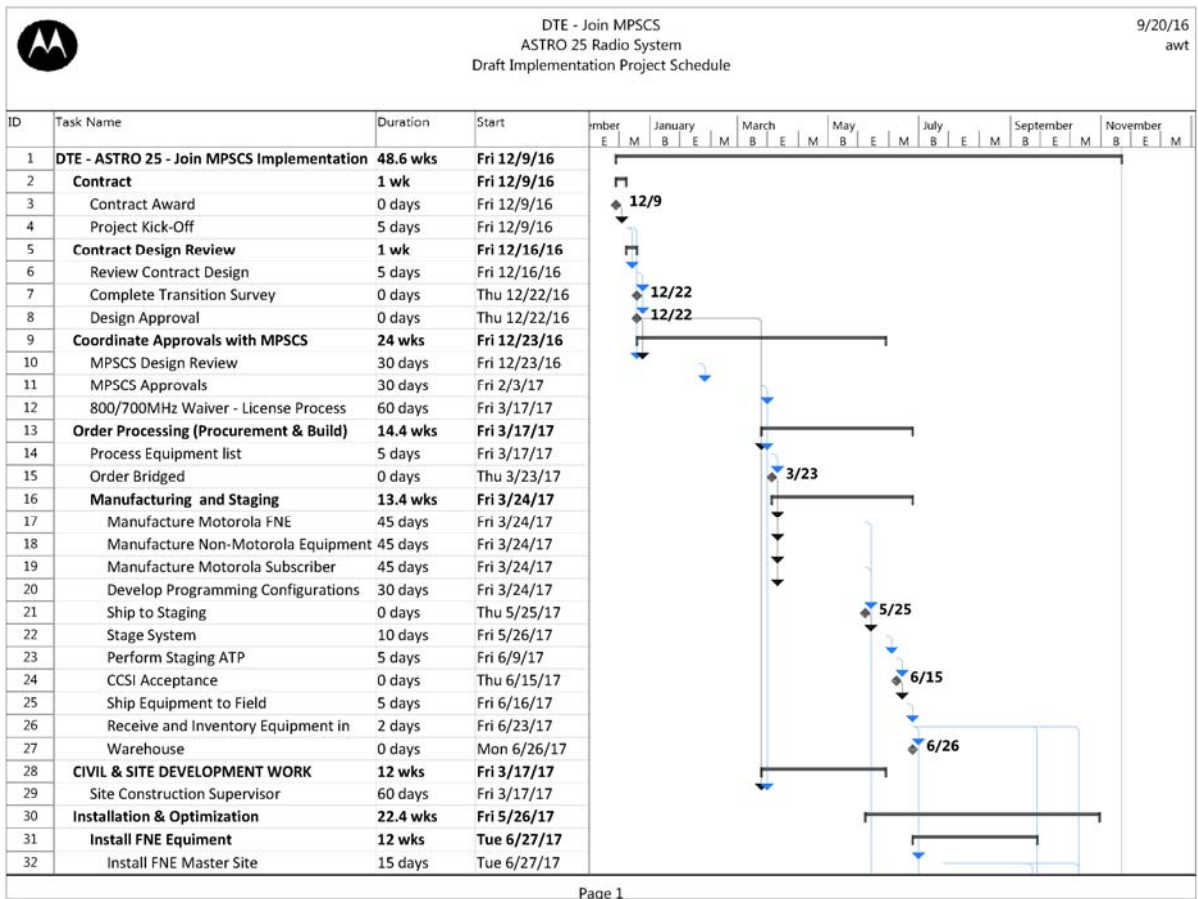
A copy of the Change Order Form is provided on the following pages as an example for your reference.



CHANGE ORDER
FORM



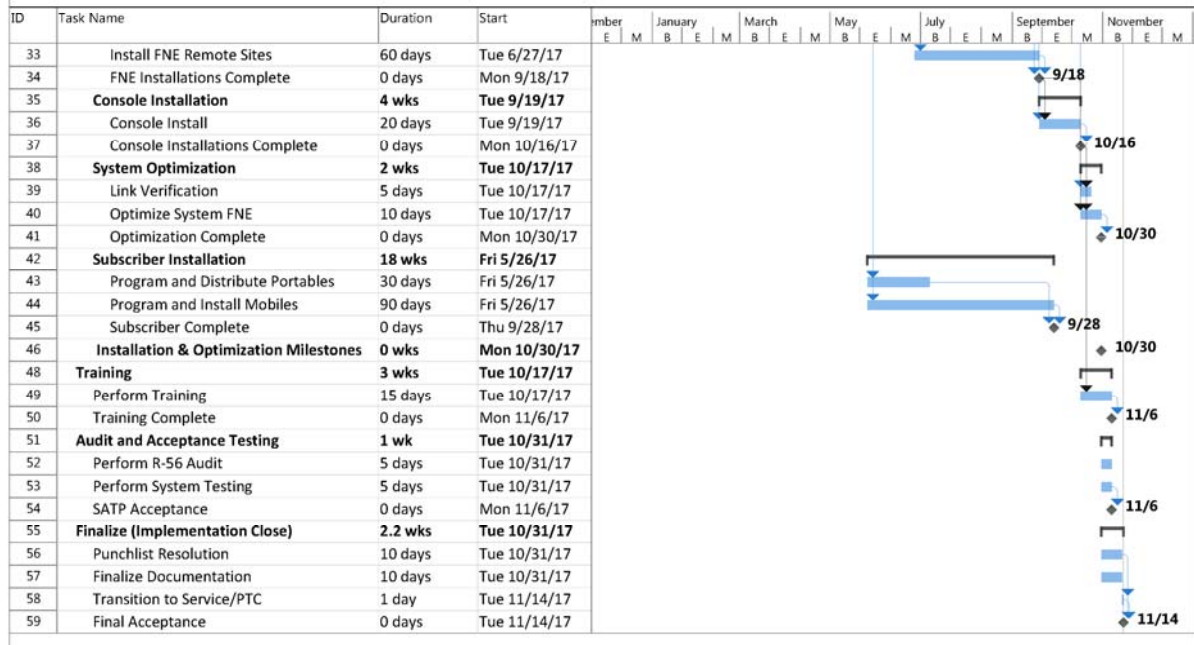
2.16 GANTT CHART





DTE - Join MPSCS
ASTRO 25 Radio System
Draft Implementation Project Schedule

9/20/16
awt



September 19, 2016
Use or disclosure of this proposal is subject
to the restrictions on the cover page.

DTE Energy
DTE Energy Add - On To MPSCS



ACCEPTANCE TEST PLAN

DTE Energy ASTRO25 System -State Add on Project

ASTRO25 System -State Add on

In-Plant Draft

3.1 WIDE AREA TRUNKING - FDMA ONLY SITES

3.1.1 Talkgroup Call

1. DESCRIPTION

The Talkgroup is the primary level of organization for communications on a trunked radio system. Radios with Talkgroup call capability will be able to communicate with other members of the same Talkgroup. This provides the effect of a private channel down to the Talkgroup level.

This test will demonstrate that a Talkgroup transmission initiated by a radio user will only be heard by system users, which have, the same Talkgroup selected. As with other types of calls, Talkgroup calls can take place from anywhere in the system.

SETUP

RADIO-1 - SITE 1 - TALKGROUP 1

RADIO-2 - SITE 2 - TALKGROUP 1

RADIO-3 - SITE 1 - TALKGROUP 2

RADIO-4 - SITE 2 - TALKGROUP 2

VERSION #1.040

2. TEST

- Step 1. Initiate a Wide Area Call with RADIO-1 in TALKGROUP 1.
- Step 2. Observe that only RADIO-2 will be able to monitor and respond to the call.
- Step 3. Initiate a Wide Area Call with RADIO-3 in TALKGROUP 2.
- Step 4. Observe that only RADIO-4 will be able to monitor and respond the call.

Pass____ Fail____



3.1.2 Continuous Assignment Updating

1. DESCRIPTION

When a talkgroup is assigned a voice channel, the site controller continues to transmit the channel assignment on the control channel for the duration of the talkgroup call. Radios coming into use on the system are automatically sent to voice channels with conversations in progress involving their selected talkgroups.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

RADIO-3 - TALKGROUP 1

VERSION #1.010

2. TEST

- Step 1. Turn OFF RADIO-1.
- Step 2. Initiate a Talkgroup Call using RADIO-2 and verify RADIO-3 hears the audio.
- Step 3. While the Talkgroup Call is in progress, turn ON RADIO-1.
- Step 4. Observe RADIO-1, which was just brought back into service, joins the Talkgroup Call already in progress.
- Step 5. End the talkgroup call.
- Step 6. Switch RADIO-1 to another talkgroup.
- Step 7. Initiate a Talkgroup Call from RADIO-2 to RADIO-3.
- Step 8. While the Talkgroup Call is in progress, set RADIO-1 back to TALKGROUP 1.
- Step 9. Observe that RADIO-1 joins the Talkgroup Call already in progress.

Pass_____ Fail_____

3.1.3 Multigroup Call in Wait Mode

1. DESCRIPTION

This trunking feature allows an equipped radio user to transmit an announcement to several different talkgroups simultaneously. The multigroup (ATG) call can be flagged for Wait Mode in the Provisioning Manager (PM) database forcing all attached talkgroups to finish calls in progress before the trunked system will process the multigroup call. The system does not permit inactive, attached talkgroups to initiate Talkgroup Calls during the "wait" timeframe. As with other types of calls, multigroup calls can take place from anywhere in the system.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

RADIO-3 - RANDOM (Not part of MG)

RADIO-4 - ATG 1

* TALKGROUP 1 and TALKGROUP 2 are members of ATG 1.

* RANDOM is any talkgroup not a member of ATG 1.

* Multigroups are set up through both the Provisioning Manager (PM) and the Subscriber Programming software.

VERSION #1.020

2. TEST

- Step 1. Verify ATG 1 is set for the Wait mode.
- Step 2. Using RADIO-1, initiate a call on TALKGROUP 1.
- Step 3. While RADIO-1 is keyed, attempt to initiate a multigroup call using RADIO-4 on ATG 1. Verify RADIO-4 receives a busy tone because one of the talkgroups attached to ATG 1 is involved in a Talkgroup Call.
- Step 4. Key RADIO-2 and verify that a busy tone is received because the ATG 1 call is in queue.
- Step 5. Dekey RADIO-1 and verify RADIO-4 receives a callback.
- Step 6. Key RADIO-4 and verify both RADIO-1 and RADIO-2 hear the multigroup call while RADIO-3 does not unmute.

Pass____ Fail____



3.1.4 Call Alert

1. DESCRIPTION

Call Alert is a tone page that allows a user to selectively alert another radio unit. The initiating radio will receive notification from the trunked system as to whether or not the page was received by the target radio. Units receiving a Call Alert will sound an alert tone. As with other types of calls, Call Alerts can take place from anywhere in the system.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

RADIO-3 - TALKGROUP 3

VERSION #1.010

2. TEST

- Step 1. Using RADIO-1, press the page button.
- Step 2. Enter the unit ID of RADIO-2 with the keypad, or scroll to the location where this ID is stored
- Step 3. Press the PTT to initiate the call alert. Verify that the RADIO-1 user receives audible indication that the Call Alert was sent.
- Step 4. Verify that RADIO-2 user receives an audible indication of an incoming Call Alert was sent but RADIO-3 does not.
- Step 5. Verify RADIO-1 gets an audible indication that the Call Alert was successfully received at the target radio.
- Step 6. Turn off RADIO-2. Send a Call Alert from RADIO-1 to RADIO-2.
- Step 7. Verify that the RADIO-1 user receives audible indication that the Call Alert was sent.
- Step 8. Verify RADIO-1 receives a "No Acknowledgement" indication that the Call Alert was not received at the target radio

Pass____ Fail____

3.1.5 Private Call

1. DESCRIPTION

Private Call is a selective calling feature that allows a radio user to carry on one-to-one conversation that is only heard by the 2 parties involved. Subscriber units receiving a private call will sound an alert tone. As with other types of calls, Private Calls can take place from anywhere in the system.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

RADIO-3 - TALKGROUP 1

VERSION #1.020

2. TEST

- Step 1. Using RADIO-1, press the Private Call (Call) button.
- Step 2. Enter the unit ID of RADIO-2 with the keypad, or scroll to the location where this ID is stored.
- Step 3. Press the PTT to initiate the Private Call.
- Step 4. Verify that RADIO-2 hears tones and the display indicates that a Private Call has been received, but RADIO-3 receives no indications.
- Step 5. Answer the call at RADIO-2 by pressing the Private Call (Call)/Respond button. If RADIO-2 has a display, verify it shows the ID number or Alias of the calling unit.
- Step 6. Press the PTT switch on RADIO-2 and respond to the Private Call. Note that if you do not press the Private Call button before pressing PTT, your audio will be heard by all members of the talkgroup, and not just by the radio initiating the Private Call.
- Step 7. Verify that RADIO-2 can communicate with RADIO-1.
- Step 8. Verify that RADIO-3 does not monitor the Private Call.
- Step 9. End the Private Call by pressing the "home" key and return to normal talkgroup operation.

Pass____ Fail____



Wide Area Trunking - FDMA Only Sites

3.1.6 Audio Interrupt / Interrupt Never Mode

1. DESCRIPTION

A radio PTT request may be received for a group already active and currently being sourced by another radio unit. The talkgroup can be flagged to either allow or disallow the new PTT. If allowed, the latest PTT request will be granted and become the source of the call.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

RADIO-3 - TALKGROUP 1

VERSION #1.020

2. TEST

- Step 1. Verify TALKGROUP 1's template is set up as Audio Interrupt Never.
- Step 2. Using RADIO-1, initiate a call on TALKGROUP 1.
- Step 3. Verify both RADIO-2 and RADIO-3 monitor the audio.
- Step 4. Using RADIO-3, initiate a call on TALKGROUP 1.
- Step 5. Verify that RADIO-3 receives a reject and that RADIO-2 continues to listen to RADIO-1.
- Step 6. Dekey both Radios.

Pass____ Fail____



3.1.7 Emergency Alarm and Call with Top of Queue

1. DESCRIPTION

Users in life threatening situations can use the Emergency button on the radio to immediately send a signal to the dispatcher and be assigned the next available voice channel. An Emergency Call can be set to either Top of Queue or Ruthless Preemption operation. During an emergency call the Emergency ID will appear on the display of the subscribers. To demonstrate this, an Emergency Alarm and Call will be initiated from a subscriber which will be received by a subscriber on the same talkgroup, affiliated at any site of any zone in the system.

NOTE: If the subscriber does not have the Display option, the Emergency ID will not be displayed.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - Any Site

RADIO-3 - TALKGROUP 2

RADIO-3 - SITE - SITE 1

RADIO-4 - TALKGROUP 3

RADIO-4 - SITE - SITE 1

All radios and talkgroups should start with default priorities. Default is 10.

2. TEST

- Step 1. Verify the emergency type for TALKGROUP 1's template is set up as Top of Queue.
- Step 2. Simulate a busy system by disabling all channels at SITE 1 with the exception of the control channel and one voice channel.
- Step 3. Press the PTT to initiate a call with RADIO-3 and hold the PTT switch until instructed to release.
- Step 4. Key RADIO-4 and verify the radio receives a busy tone. Release the PTT switch on RADIO-4.
- Step 5. Using RADIO-1 send an Emergency Call by depressing the emergency switch and then the PTT switch.
- Step 6. Observe that RADIO-1 cannot transmit due to the voice channel being busy.
- Step 7. Release the PTT switch on RADIO-3.
- Step 8. Observe that RADIO-1 receives the call back before RADIO-4 and is able to proceed with the call. Also observe that the display on RADIO-2 denotes an emergency and the unit ID or alias of RADIO-1.
- Step 9. Dekey RADIO-1 and end the Emergency Call by holding down the Emergency button on RADIO-1 until an alert tone sounds. Verify RADIO-1 returns to normal operation and that RADIO-4 receives a callback.
- Step 10. Return the system to normal operation by enabling all the channels at SITE 1.

VERSION #1.010

Pass____ Fail____



3.2 SITE TRUNKING - FDMA ONLY SITES

3.2.1 Site Trunking Indication

1. DESCRIPTION

When a remote site loses its link or does not have a link to the Zone Controller, the affected site will enter "Site Trunking" mode of operation. Radios locked onto this site will be serviced locally within this site's coverage area.

NOTE: If the subscriber does not have the Display option, the "Site Trunking" indication will not be displayed.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 2

RADIO-2 - SITE - SITE 1

Lock the subscribers to SITE 1 if more than one site exists on the system.

VERSION #1.010

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Verify that RADIO-1 and RADIO-2 are displaying the "Site Trunking" indication.
- Step 3. Return the site to Wide Area Trunking unless the next test requires Site Trunking.

Pass____ Fail____

Site Trunking - FDMA Only Sites

3.2.2 Talkgroup Call

1. DESCRIPTION

When a site goes into Site Trunking, radios with Talkgroup Call capability will be able to communicate with other members of the same talkgroup at that same site. Members of the same talkgroup at other sites will not be able to monitor those conversations.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

RADIO-3 - TALKGROUP 1

RADIO-3 - SITE - SITE 2

RADIO-4 - TALKGROUP 1

RADIO-4 - SITE - SITE 2

Note: All Radios should be "Site Locked"

VERSION #1.010

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Initiate a Talkgroup Call with RADIO-1 on TALKGROUP 1 at SITE 1.
- Step 3. Observe that only RADIO-2 will be able to monitor and respond to the call. Note that RADIO-3 and RADIO-4 are not able to monitor the call since the site is not in wide area operation.
- Step 4. Initiate a Talkgroup Call with RADIO-3 on TALKGROUP 1 at SITE 2.
- Step 5. Observe that only RADIO-4 will be able to monitor and respond to the call.

Pass____ Fail____



Site Trunking - FDMA Only Sites

3.2.3 Call Alert

1. DESCRIPTION

Call Alert is a tone page that allows a user to selectively alert another radio unit. When a site is in Site Trunking, Radios at the site will only be able to Call Alert other radios at the same site. The initiating radio will receive notification from the trunked system as to whether or not the page was received by the target radio.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 2

RADIO-2 - SITE - SITE 1

Note: All Radios should be "Site Locked"

VERSION #1.010

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Using RADIO-1, press the page button.
- Step 3. Enter the Unit ID of RADIO-2 with the keypad, or scroll to the location where this ID is stored.
- Step 4. Press the PTT to initiate the Call Alert.
- Step 5. Verify that RADIO-2 received the Call Alert.
- Step 6. Exit the Call Alert mode and return to normal talkgroup mode.
- Step 7. Return the site to Wide Area Trunking unless the next test requires Site Trunking.

Pass____ Fail____



3.2.4 Private Call

1. DESCRIPTION

Private Call is a selective calling feature that allows a dispatcher or radio user to carry on one-to-one conversation that is only heard by the 2 parties involved. When a site is in Site Trunking, Radios at the site will only be able to Private Call other radios at the same site.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

RADIO-3 - TALKGROUP 1

RADIO-3 - SITE - SITE 1

Note: All Radios should be "Site Locked"

VERSION #1.020

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Using RADIO-1, press the Private Call button.
- Step 3. Enter the Unit ID of RADIO-2 with the keypad, or scroll to the location where this ID is stored.
- Step 4. Press the PTT to initiate the call.
- Step 5. Verify that at RADIO-2 only tones are heard and the display indicates that a call has been received.
- Step 6. Answer the call at RADIO-2 by pressing the Private Call/Respond button. Verify its display shows the ID number or alias of the calling unit.
- Step 7. Press the PTT switch on RADIO-2 and respond to the call. Note that if you do not press the Private Call button before pressing PTT, your audio will be heard by all members of the talkgroup, and not by the radio initiating the Private Call.
- Step 8. Verify only RADIO-1 hears the audio from RADIO-2.
- Step 9. End the Private Call. Return the site to Wide Area Trunking unless the next test requires Site Trunking.

Pass____ Fail____



3.2.5 Continuous Assignment Updating

1. DESCRIPTION

When a talkgroup is assigned a voice channel, the site controller continues to transmit the channel assignment on the control channel for the duration of the Talkgroup Call. Radios coming into use on the system are automatically sent to voice channels with conversations in progress involving their selected talkgroups.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

RADIO-3 - TALKGROUP 1

RADIO-3 - SITE - SITE 1

Note: All Radios should be "Site Locked"

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Turn OFF RADIO-1.
- Step 3. Initiate a Talkgroup Call using RADIO-2.
- Step 4. While the Talkgroup Call is in progress, turn on RADIO-1.
- Step 5. Observe that RADIO-1, which was just brought back into service, joins the Talkgroup Call already in progress.
- Step 6. Release the PTT of RADIO-2. Switch RADIO-1 to TALKGROUP 2.
- Step 7. Initiate a Talkgroup Call using RADIO-2.
- Step 8. While the Talkgroup Call is in progress, turn RADIO-1 back to TALKGROUP 1.
- Step 9. Observe that RADIO-1, which was just set back to TALKGROUP 1, joins the Talkgroup Call already in progress.
- Step 10. Return the site to Wide Area Trunking unless the next test requires Site Trunking.

VERSION #1.010

Pass____ Fail____

3.2.6 Busy Queuing and Callback

1. DESCRIPTION

If no voice channel resources are available, radios requesting channels for new conversations are placed in the busy queue. Users of the same priority will move through the queue in a FIFO (first in, first out) sequence. When a voice channel becomes available, the radio at the top of the busy queue gets a channel assignment and generates a callback tone. The callback alerts the user that a channel assignment was made and transmitting is now possible on the selected talkgroup.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 2

RADIO-2 - SITE - SITE 1

RADIO-3 - TALKGROUP 3

RADIO-3 - SITE - SITE 1

RADIO-4 - TALKGROUP 1

RADIO-4 - SITE - SITE 1

Note: All radios are "Site Locked."

VERSION #1.030

2. TEST

- Step 1. Simulate a busy system by disabling all channels at SITE 1 with the exception of the control channel and one voice channel.
- Step 2. Initiate a Talkgroup Call with RADIO-1 and observe that RADIO-4 receives the call. Keep this call in progress until instructed to end the call.
- Step 3. Key RADIO-2 and observe that the radio receives a busy.
- Step 4. Key RADIO-3 and observe that the radio receives a busy.
- Step 5. End the Talkgroup Call established in Step 2.
- Step 6. Observe that RADIO-2 receives a callback prior to RADIO-3 receiving a callback.
- Step 7. Return the site to Wide Area Trunking unless the next test requires Site Trunking

Pass____ Fail____



3.2.7 Emergency Call and Alarm

1. DESCRIPTION

Emergency Alarms and Calls can be initiated by subscribers when the registered site is in Site Trunking. With all subscribers registered on a Site Trunking site, a subscriber will initiate an Emergency Alarm by pressing the Emergency button. By pressing the PTT, an Emergency Call will be issued and the ID of the initiator will be displayed with an Emergency indication by the other subscribers on the same talkgroup.

Note that for site trunking, Emergency Call operation is always Top of Queue.

SETUP

RADIO-1 - TALKGROUP 1
RADIO-1 - SITE - SITE 1
RADIO-2 - TALKGROUP 1
RADIO-2 - SITE - SITE 1
RADIO-3 - TALKGROUP 2
RADIO-3 - SITE - SITE 1
RADIO-4 - TALKGROUP 3
RADIO-4 - SITE - SITE 1

Note: All Radios should be "Site Locked"

VERSION #1.010

2. TEST

- Step 1. Place SITE 1 into the Site Trunking mode.
- Step 2. Simulate a busy system by disabling all channels at SITE 1 with the exception of the control channel and one voice channel.
- Step 3. Press the PTT on RADIO-3 and hold the PTT switch until instructed to release.
- Step 4. Key RADIO-4 and observe that the radio receives a busy.
- Step 5. Using RADIO-1, initiate an emergency alarm followed by an emergency call.
- Step 6. Observe that RADIO-1 cannot transmit due to the voice channel being busy.
- Step 7. Release the PTT switch on RADIO-3.
- Step 8. Observe that RADIO-1 can now proceed with the call and RADIO-2 receives the call. Also observe that the display on RADIO-2 denotes an emergency and the ID or Alias of the unit sending the emergency.
- Step 9. End the emergency call and verify that RADIO-4 gets a callback.
- Step 10. Restore all channels to service and return the site to Wide Area Trunking unless the next test requires Site Trunking.

Pass____ Fail____

3.3 MCC 7100/7500 TRUNKED RESOURCES

3.3.1 Instant Transmit

1. DESCRIPTION

The instant transmit switch provides immediate operator access to a channel, independent of its select status (selected or unselected). It provides priority over other dispatcher transmit bars or optional footswitches.

SETUP

RADIO-1 - TALKGROUP 1

CONSOLE-1 – TALKGROUP 1 (Selected),
TALKGROUP 2 (Unselect mode)

VERSION #1.010

2. TEST

- Step 1. Using CONSOLE-1, press the Instant Transmit button on TALKGROUP 1.
- Step 2. Verify that the Transmit indicator is lit.
- Step 3. Verify RADIO-1 can monitor and respond to the call on TALKGROUP 1.
- Step 4. On RADIO-1 change to TALKGROUP 2.
- Step 5. Using CONSOLE-1, press the Instant Transmit button on the TALKGROUP 2 radio resource.
- Step 6. Verify RADIO-1 can monitor and respond to the call on TALKGROUP 2.

Pass_____ Fail_____

3.3.2 Talkgroup Selection and Call

1. DESCRIPTION

The Talkgroup Call is the primary level of organization for communications on a trunked radio system. Dispatchers with Talkgroup Call capability will be able to communicate with other members of the same talkgroup. This provides the effect of an assigned channel down to the talkgroup level. When a Talkgroup Call is initiated from a subscriber unit, the call is indicated on each dispatch operator position that has a channel control resource associated with the unit's channel/talkgroup.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

RADIO-3 - TALKGROUP 1

RADIO-4 - TALKGROUP 2

CONSOLE-1 - TALKGROUP 1

CONSOLE-2 - TALKGROUP 2

VERSION #1.010

2. TEST

- Step 1. Initiate a wide area call from CONSOLE-1 on TALKGROUP 1.
- Step 2. Observe that RADIO-1 and RADIO-3 will be able to monitor the call. Dekey the console and have either radio respond to the call.
- Step 3. Observe that all consoles with TALKGROUP 1 can monitor both sides of the conversation.
- Step 4. Initiate a wide area call from CONSOLE-2 on TALKGROUP 2.
- Step 5. Observe that RADIO-2 and RADIO-4 will be able to monitor the call. Dekey the console and have either radio respond to the call.
- Step 6. Observe that all consoles with TALKGROUP 2 can monitor both sides of the conversation.

Pass____ Fail____

3.3.3 Emergency Alarm and Call Display Description

1. DESCRIPTION

Users in life threatening situations can use the emergency button on the radio to send an audible alarm and a visual alarm signal to a console operator in order to request immediate system access to a voice channel for an emergency call.

An emergency alarm begins after the radio user presses the radio's emergency button. Pressing the emergency button places the radio in "emergency mode". To begin an emergency call, the radio user must press the radio's PTT button while in "emergency mode." The assigned voice channel will be dedicated to the emergency caller's talkgroup for an extended period of time, equal to the Message Hang Time plus the Emergency Hang Time. As with other call types, emergency calls can operate across sites as well as within the same site.

SETUP

RADIO-1 - TALKGROUP 1

CONSOLE-1 - TALKGROUP 1

CONSOLE-2 - TALKGROUP 1

VERSION #1.010

2. TEST

- Step 1. Initiate an Emergency Alarm from RADIO-1.
- Step 2. Observe the Emergency from RADIO-1 is received at CONSOLE-1 for TALKGROUP 1.
- Step 3. Acknowledge the Emergency at the operator position. Verify CONSOLE-2 receives notification that the call has been acknowledged.
- Step 4. Initiate a call with RADIO-1 to initiate an Emergency call.
- Step 5. Observe CONSOLE-1 and CONSOLE-2 can monitor RADIO-1
- Step 6. Clear the Emergency from CONSOLE-1 on TALKGROUP 1.
- Step 7. End the Emergency Alarm from RADIO-1.

Pass____ Fail____



3.3.4 Multigroup Call

1. DESCRIPTION

This trunking feature allows an equipped console operator position to transmit an announcement to several different talkgroups simultaneously. As with Talkgroup Calls, multigroup calls operate across sites as well as within the same site.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

RADIO-3 - RANDOM

CONSOLE-1 - ATG 1

Note: TALKGROUP 1 and TALKGROUP 2 are members of ATG 1. RANDOM is any talkgroup not a member of ATG 1.

VERSION #1.010

2. TEST

- Step 1. Using CONSOLE-1, select the ATG 1 resource.
- Step 2. Initiate the Multigroup Call from CONSOLE-1.
- Step 3. Observe that RADIO-1 and RADIO-2 receive the Multigroup Call.
- Step 4. Verify that RADIO-3 does not receive the Multigroup Call because it is not a member of ATG 1.
- Step 5. Answer the Multigroup Call using RADIO-1 and observe CONSOLE-1 receives the response.
- Step 6. Verify that if the call is answered within the repeater hang time, the console will receive the call on the ATG 1 resource tile, otherwise the console will receive the call on the TALKGROUP 1 tile.
- Step 7. Verify that if the call is answered within the repeater hang time, RADIO-2 will monitor the call.

Pass____ Fail____

3.3.5 Multi-Select Operation

1. DESCRIPTION

Multi-Select (Msel) allows the console operator to group a number of channels/talkgroups together such that when the general transmit bar is depressed, all of the multi-selected channels/talkgroups will transmit at the same time with the same information. Multi-Select is one way communication call. If a radio user responds to a Multi-Select call the talkgroup the user is affiliated to will be the only one to hear the call. There is no super-group formed, so radio communication is still at the single talkgroup level. Multi-Select is utilized to send an APB to several channels/talkgroups. A Multi-Select has a limit of twenty (20) trunking/conventional resources

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

CONSOLE-1 - TALKGROUP 1, TALKGROUP 2

2. TEST

- Step 1. From CONSOLE-1, create an Msel group with TALKGROUP 1 and TALKGROUP 2.
- Step 2. Transmit on the Msel using the Msel instant transmit button.
- Step 3. Verify that RADIO-1 and RADIO-2 hear the call.
- Step 4. Initiate a call with RADIO-1.
- Step 5. Verify the call is heard on CONSOLE-1 but not on RADIO-2.
- Step 6. Initiate a call with RADIO-2.
- Step 7. Verify the call is heard on CONSOLE-1 but not on RADIO-1.
- Step 8. On CONSOLE-1 dissolve the Msel.

Pass____ Fail____

VERSION #1.010



3.3.6 Talkgroup Patch

1. DESCRIPTION

Talkgroup Patch allows a dispatcher to merge several talkgroups together on one voice channel to participate in a single conversation. This can be used for situations involving two or more talkgroups that need to communicate with each other.

Using the Patch feature, the console operator can talk and listen to all of the selected talkgroups grouped; in addition, the members of the individual talkgroups can also talk or listen to members of other talkgroups. Patched talkgroups can communicate with the console dispatcher and other members of different talkgroups because of the "supergroup" nature of the Patch feature.

NOTE : If "secure" and "clear" resources are patched together, one repeater for each mode may be assigned per site.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 2

RADIO-3 - TALKGROUP 1

RADIO-4 - TALKGROUP 2

CONSOLE-1 - TALKGROUP 1 and TALKGROUP 2

Note: All 4 Radios must have the same home zone.

VERSION #1.010

2. TEST

- Step 1. Using CONSOLE-1 create a patch between TALKGROUP 1 and TALKGROUP 2.
- Step 2. Initiate a patch call from CONSOLE-1.
- Step 3. Verify RADIO-1, RADIO-2, RADIO-3, and RADIO-4 can monitor the call.
- Step 4. Initiate several calls between the radios and verify successful communication.
- Step 5. Dissolve the patch created in step 1.

Pass____ Fail____

3.3.7 Alert Tones - Talkgroup

1. DESCRIPTION

Pre-defined alert tones can be transmitted on the selected Radio Resource to subscribers which can alert members of a channel / talkgroup to a particular event or signify to radio users special instructions are to follow. The Console has the ability to send an Alert-Tone signal on selected conventional or talkgroup resources.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

CONSOLE-1 - TALKGROUP 1

VERSION #1.040

2. TEST

- Step 1. Select TALKGROUP 1 on CONSOLE-1.
- Step 2. Select Alert Tone 1 and depress the Alert Tone button.
- Step 3. Verify that RADIO-1 and RADIO-2 hear Alert Tone 1.
- Step 4. Repeat Steps 2-3 for Alert Tone 2 and 3.

Pass_____ Fail_____



3.3.8 Call Alert

1. DESCRIPTION

Call Alert Page allows a subscriber/dispatcher to selectively alert another radio unit. The initiating subscriber/console will receive notification as to whether or not the call alert was received. Units receiving a Call Alert will sound an alert tone and show a visual alert indication. The display will also show the individual ID of the initiating subscriber/console unit.

SETUP

RADIO-1 - TALKGROUP 1

CONSOLE-1 - TALKGROUP 1

VERSION #1.030

2. TEST

- Step 1. Using CONSOLE-1, select the call alert button in the "Private Call" resource window.
- Step 2. Enter the ID of RADIO-1 and send the call alert to RADIO-1.
- Step 3. Verify that RADIO-1 receives the alert and that the ID or alias of the console is shown.
- Step 4. Turn off RADIO-1.
- Step 5. Using CONSOLE-1, send the call alert to RADIO-1 again.
- Step 6. Verify that after trying to page RADIO-1, the console displays "Can not send call alert - target not found" in the summary/status list.

Pass____ Fail____

3.3.9 Console Initiated Private Call to Subscriber

1. DESCRIPTION

Private Conversation is a selective calling feature which allows a dispatcher or radio user to carry on one-to-one conversation that is heard only by the two parties involved. Subscriber units receiving a private call will sound an alert tone. As with other call types, Private Calls operate across sites as well as within the same site.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

CONSOLE-1 - TALKGROUP 1

VERSION #1.020

2. TEST

- Step 1. Using CONSOLE-1, select the "PRIVATE-CALL" tile and click the Private Call function.
- Step 2. Select the unit to be Private Called, in this case RADIO-1. (or select the numeric keypad and enter the Unit ID to be Private Called.)
- Step 3. Click the Send button.
- Step 4. Answer the Private Call with RADIO-1 and respond to the console.
- Step 5. Verify RADIO-2 does not hear the private conversation.
- Step 6. After completing the Private Call, return to the normal talkgroup mode.

Pass____ Fail____



3.3.10 Console Priority

1. DESCRIPTION

Console Operator Positions have ultimate control of transmitted audio on an assigned voice channel resource. The Console Position has the capability to take control of an assigned voice channel for a talkgroup call so that the operator's audio overrides any subscriber audio. Console priority is a feature that enables dispatchers to gain immediate access to an assigned voice channel so that a central point of audio control exists.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-2 - TALKGROUP 1

CONSOLE-1 - TALKGROUP 1

VERSION #1.020

2. TEST

- Step 1. Initiate a Talkgroup call from RADIO-1 on TALKGROUP 1. Keep this call in progress until the test has completed.
- Step 2. Observe that RADIO-2 receives the call.
- Step 3. While the call is in progress, key up CONSOLE-1 on TALKGROUP 1.
- Step 4. Observe that RADIO-2 is now receiving audio from CONSOLE-1 on TALKGROUP 1.
- Step 5. De-key CONSOLE-1.
- Step 6. Verify RADIO-2 now receives RADIO-1 audio.
- Step 7. End the TALKGROUP 1 call from RADIO-1.

Pass____ Fail____

3.3.11 Activity Log

1. DESCRIPTION

The Console activity log will show all traffic for the resource assigned to that console to include the time, radio alias, TG, PTT ID and Emergency Call.

The dispatcher has the capability of selecting a logged call within in the "Activity Log Window" for instant transmit on the corresponding logged resource.

This activity log can be logged to a text file for archival purposes.

Note: The log file in the ops will only be seen if you first check Log Activity in Elite Admin application then in folder options uncheck hide hidden system files. The location will be
c:\Program
Data\MCC7500\MessageMonitorLogs.

SETUP

RADIO-1 – TALKGROUP 1

RADIO-2 – TALKGROUP 2

RADIO-3 – TALKGROUP 3

RADIO-4 – TALKGROUP 4

CONSOLE-1 – TALKGROUP 1, TALKGROUP 2,
TALKGROUP 3, TALKGROUP 4

VERSION #1.020

2. TEST

- Step 1. On CONSOLE-1 select the "Show Activity Log" button on the tool bar to open the Activity Log Window.
- Step 2. Initiate calls on RADIO-1, RADIO-2, RADIO-3 and RADIO-4 to log call information and verify calls are displayed in the activity log window.
- Step 3. Select a logged call in the Activity Log Window and verify that the Channel Control Window (CCW) at the top of the Activity log window changes to the corresponding resource. Verify the dispatcher is capable of responding via the instant transmit button.
- Step 4. Open the text file created by the Activity Log and verify call traffic has been archived to the document file.

Pass____ Fail____



3.4 FAULT MANAGEMENT

3.4.1 Unified Event Manager - Views

1. DESCRIPTION

The Unified Event Manager (UEM) provides three different views. The purpose of this test is to demonstrate the views available from the UEM.

For A7.14: Custom views can be saved and retrieved by other NM Client users. This test demonstrates this capability, as well as demonstrating an improvement in display of Channel information.

SETUP

NMclient01 - UEM session up and running.

VERSION #1.050

2. TEST

- Step 1. The first view is the Active Alarms. In the navigation pane expand Fault Management and select Network Events.
- Step 2. Customize the Active Alarms display by selecting the View option from the menu bar, then select Search.
- Step 3. Perform a Managed Resource search for channels, site controllers and routers by entering "Contains" and ch, sc, and z00 respectively in the search fields to perform the three separate searches.
- Step 4. For each of the three searches a filtered alarm view is displayed that contains alarms for the appropriate device in the search.
- Step 5. The second view is the Physical Summary view. In the navigation pane, expand Zone Maps and select Physical Summary. The Physical Summary View provides an aggregated alarm severity status of the devices located at all subnets in the Zone.
- Step 6. The third view is the Service Summary. In the navigation pane, under Zone Maps select Service Summary. The Service Summary View provides a quick summary of the service status of sites in a Zone, including access to Channel status.
- Step 7. In the main UEM window is an Alarm Summary View pane. In the Alarm Summary View, select the format for the desired view, pie, tabular or bar.
- Step 8. Create a custom view. View the Active Alarms display to see result. Perform right click on the Network Events tree node in the navigation window and select export function. Select filter view, and provide a target location to save the custom view tree structure on NM Client.

- Step 9. Log out of the UEM application, and log back in as a different user. Retrieve the custom view saved in step 8. View the Active Alarms display to see the same view.
- Step 10. Navigate Network Database, select Repeater/Conventional Site and from Managed Resources menu, select Managed Resource Properties. Choose channel tab to display all channel status.

Pass_____ Fail_____

Fault Management

3.4.2 Station Power Amp Failure Reports to the Unified Event Manager (UEM)

1. DESCRIPTION

This test will demonstrate that the Unified Event Manager (UEM) alarms view is able to capture information about various failures at the system and zone level.

A station will be keyed while the output is unloaded to simulate a power amp failure. The failures will be monitored on the UEM.

Note: For safety, either power down the station or TX Inhibit it before disconnecting or re-connecting the dummy load to prevent accidental keying of the station.

Note: This test should be done on a site with more than 2 channels. Failsoft will occur if the test is done on a 2 channel site.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 2

RADIO-2 - SITE - SITE 1

NMclient01 - UEM session up and running.

* All Radios should be "Site Locked"

VERSION #1.020

2. TEST

- Step 1. Verify that the power amp of the station to be tested has no active alarms against it.
- Step 2. Disconnect the dummy load/antenna from the station.
- Step 3. Make several talkgroup calls using RADIO-1 until the test station has been keyed.
- Step 4. Observe that an alarm indicating a Power Amp failure appears on the UEM alarms view. For SmartX sites you will need to look at event view to see cause of alarm.
- Step 5. Reconnect the dummy load/antenna disconnected in Step 3.
- Step 6. In approximately 5 minutes, observe the changes to the alarm on the UEM, indicating the module is restored to service.

Pass____ Fail____



3.5 RADIO TO RADIO FEATURES

3.5.1 Trunked Radio Resource Call - Coded Mode

1. DESCRIPTION

Subscribers can communicate to each other on the Talkgroup that they are selected on via the channel selector on the individual radio in a coded/secure call.

The signals that are received by the subscriber radio are repeated so that only other radios on that Talkgroup that have secure capability with the correct encryption key will be able to participate in the conversation.

SETUP

RADIO-1 - SITE 1

RADIO-2 - SITE 1

RADIO-3 - SITE 1

RADIO-3 should not be secure capable, should not have a key loaded or should have a different encryption key than RADIO-1 and RADIO-2.

VERSION #1.030

2. TEST

- Step 1. Initiate a call on RADIO-1 in the coded mode.
- Step 2. Verify communications on RADIO-2 (coded).
- Step 3. Verify that RADIO-3 does not hear the conversation even though it is on the same channel as RADIO-1 & RADIO-2.
- Step 4. Initiate a call on RADIO-1 in the clear mode.
- Step 5. Verify communications on RADIO-2 and RADIO-3.
- Step 6. Repeat above tests for each site.

Pass____ Fail____

3.6 SYSTEM MANAGEMENT TESTS

3.6.1 ZoneWatch

1. DESCRIPTION

ZoneWatch is an administration tool for monitoring radio traffic on a system. A system manager can use ZoneWatch to analyze traffic patterns for load distribution and troubleshoot radio and site problems. ZoneWatch is used to view current radio traffic activity for the system. This activity is displayed in graphical format, color-coded for easy identification of the type of activity occurring on the system.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 2

RADIO-3 - TALKGROUP 1

RADIO-3 - SITE - SITE 3

RADIO-4 - TALKGROUP 1

RADIO-4 - SITE - SITE 4

VERSION #1.010

2. TEST

- Step 1. Verify that ZoneWatch has been configured for the Grid and Multi Site Scroll windows to display system activity.
- Step 2. From the PC Application Launcher, select a zone folder.
- Step 3. From within that zone, select ZoneWatch.
- Step 4. Select the appropriate profile to be able to view the channel usage on the system.
- Step 5. Initiate several calls with the radios and observe that the appropriate channel usage information is displayed.

Pass____ Fail____

3.6.2 Configuration Management - Access Permissions

1. DESCRIPTION

In ASTRO releases the Radio System Infrastructure management is done in the Unified Network Configurator (UNC) application. The Unified Network Configurator Wizard (UNCW) also helps to configure the system by having a User interface into the system configuration.

Configuration parameters such as Individual and Talkgroup Default Access Permission, and Site Access Denial Type can be manipulated from these applications.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

VERSION #1.030

2. TEST

- Step 1. Delete the database record for RADIO-1 from the Provisioning Manager so that the system does not have any knowledge of RADIO-1. And distribute the configuration from the Provisioning Manager (i.e. invoke Distribute Configuration Changes operation).
- Step 2. Verify the "Individual Default Access Permission" flag is set to "NO". If changes are made, approve the job in Voyence, then Publish Infrastructure Data from the Unified Network Configuration Wizard (UNCW).
- Step 3. Initiate a call from RADIO-1 on TALKGROUP 1. Verify that the Radio System rejects the RADIO-1 call request because RADIO-1 has not been defined in the Radio User database.
- Step 4. Change the Individual Default Access Permission flag to YES. After approving the job in Voyence, Publish Infrastructure Data from the UNCW.
- Step 5. Initiate a call from RADIO-1. Verify that the system permits the RADIO-1 call request because the system grants radio access using default settings.
- Step 6. From the Provisioning Manager, configure the RADIO-1 records that was automatically created as a result of the radio's PTT. And distribute the configuration from the Provisioning Manager (i.e. invoke Distribute Configuration Changes operation).
- Step 7. Reset the "Individual Default Access Permission" flag to NO. After approving the job in Voyence, Publish Infrastructure Data from the UNCW.
- Step 8. Initiate a call from RADIO-1. Verify that the Radio System permits the RADIO-1 call request because RADIO-1 is now a valid user.

Pass____ Fail____



System Management Tests

3.6.3 Configuration Management - General Timeout Parameters

1. DESCRIPTION

System and call timeout parameters such as Private Call Ring, Group Call Service Timeout, Private Call Hang Time, Emergency Call Hang time, Maximum Group Call Duration and Maximum Private Call Duration can also be manipulated from the Unified Network Configurator (UNC) Wizard.

For this test the Private Call Duration will be limited to one minute. The call will change to transmission trunked after the one minute timer expires at which time the hang timers will come into play. Once the users have discontinued using the system for the Private Call long enough for the hang timers to expire the system will end the call.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

VERSION #1.010

2. TEST

- Step 1. Initiate a TALKGROUP 1 call from RADIO-1. Verify that the Radio System permits the RADIO-1 call request.
- Step 2. In the manager, configure the "Maximum Private Call Duration" to 1 minute and apply.
- Step 3. Initiate a Private Call from RADIO-1 to RADIO-2. Continue to converse back and forth using RADIO-1 and RADIO-2,
- Step 4. Verify that after one minute elapses, the system will transmission trunk the Private Call because the maximum call duration has been exceeded. Once the hang time timer has expired the call will be terminated.
- Step 5. Reset the Private Call Maximum Call Duration setting to be 10 minutes (default).

Pass____ Fail____



3.6.4 Configuration Management - Subscriber Capabilities

1. DESCRIPTION

The Provisioning Manager (PM) controls the parameters for all radio users and dispatchers on the system. Within the Subscriber section, the Radio User Configuration Window enables the network manager to tailor SmartZone subscribers' capabilities. Multigroup, Secure, Call Alert, Private Call, and Telephone Interconnect are some of the features that can be enabled or disabled. The features that could be unique to the particular user are configured directly in the Radio User Configuration Window. The features that could be configured the same for a group of users are placed into records called profiles. The network manager references the profile which contains the desired setup for these features from the Radio User Configuration Window.

Note - A profile must already exist to be referenced through the Radio Configuration Window but can be modified later if needed.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 2

* Flag both radios to be capable of Call Alert, Private Call, and Dispatch Calls.

* Set the "User Enabled" flag to YES for both RADIO-1 and RADIO-2.

VERSION #1.010

2. TEST

- Step 1. Initiate a Call Alert (PAGE) from RADIO-1 to RADIO-2. Verify that RADIO-2 receives the Call Alert.
- Step 2. Change the Call Alert Enabled flag to NO for RADIO-1 via the PM.
- Step 3. Initiate a Call Alert from RADIO-2 to RADIO-1. Verify that RADIO-2 receives a reject when attempting to Call Alert RADIO-1.
- Step 4. Change the Call Alert Enabled flag back to YES for RADIO-1 via the PM.
- Step 5. Initiate a Call Alert from RADIO-2 to RADIO-1. Verify that RADIO-1 now receives the Call Alert.
- Step 6. Initiate a Private Call (CALL) from RADIO-1 to RADIO-2. Verify that RADIO-2 receives the Private Call.
- Step 7. Change the Private Call Enabled flag to NO for RADIO-1 via the PM.
- Step 8. Initiate a Private Call from RADIO-2 to RADIO-1. Verify that RADIO-2 receives a reject when attempting to Private Call RADIO-1.
- Step 9. Change the Private Call Enabled flag back to YES for RADIO-1 via the PM.
- Step 10. Initiate a Private Call from RADIO-2 to RADIO-1. Verify that RADIO-1 now receives the Private Call.

Pass____ Fail____



3.6.5 Configuration Management - Talkgroup Capabilities

1. DESCRIPTION

The Provision Manager (PM) controls the parameters for all radio users and dispatchers on the system.

Within the Subscriber section, the Talkgroup Configuration Window enables the network manager to tailor SmartZone Talkgroup Capabilities. Emergency, Secure and Priority Monitor are some of the features that can be enabled or disabled. The features that could be unique to the particular user are configured directly in the Talkgroup Configuration Window. The features that could be configured the same for a group of users are placed into records called profiles. The network manager references the profile which contains the desired setup for these features from the Talkgroup Configuration Window.

NOTE: A profile must already exist to be referenced through the Talkgroup Configuration Window but can be modified later if needed.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 2

* Set the "Talkgroup Enabled" flag to YES for TALKGROUP 1 in the PM.

2. TEST

- Step 1. Initiate a call from RADIO-1 on TALKGROUP 1. Verify that RADIO-2 hears the RADIO-1 audio.
- Step 2. Change the Talkgroup Enabled flag to NO for TALKGROUP 1 via the PM.
- Step 3. Initiate a call from RADIO-1 or RADIO-2 on TALKGROUP 1. Verify that neither radio can initiate a call because of the change in status of the Group Enabled Flag of TALKGROUP 1.
- Step 4. Initiate an Emergency call from RADIO-1. Verify that both the console (if present) and RADIO-2 can hear the transmission.
- Step 5. Dekey RADIO-1.
- Step 6. Change the Talkgroup Enabled flag back to YES for TALKGROUP 1 via the PM.
- Step 7. Initiate a call from RADIO-1 on TALKGROUP 1. Verify that both the console (if present) and RADIO-2 hear RADIO-1.

VERSION #1.030

Pass_____ Fail_____

3.6.6 Unified Event Manager - User Actions Create Audit Trails

1. DESCRIPTION

One of the functions of the Unified Event Manager (UEM) that can be managed under Security Management is the User activity log, also called Audit Trails, containing:

Operations invoked by the user.

The name of the user who invoked the operation.

Data and time of invocation.

Target device/object on which the operation was invoked.

The status of the operation.

The category of invoked operation.

This test will demonstrate that Unified Event Manager (UEM) user actions are logged by the system. These audit items log the history of activity for a period of up to 1 year.

Note: The audit log is part of the UEM database. A database restore or reload of the UEM may affect the audit log history.

SETUP

NMclient 01 - UEM client session active.

NOTE: If the Authentication Audit Log has been cleared there will only be the event to clear the log.

VERSION #1.050

2. TEST

- Step 1. On a UEM client session, select Administration from the menu bar and then System Administration. The Administration Menu window opens up.
- Step 2. In the System Administration window, click on Audit Trails.
- Step 3. Verify the Audit Log is displayed. The following information is displayed for each entry: User Name, Operation, Audit Time, Severity, Category, and Audited Object. User actions recorded include: Authentication, Logout, Discovery, Synchronization, Device Deletion, Command, Telnet, and Manage/Unmanage.

Pass____ Fail____



3.6.7 License Manager – Session Force Release

1. DESCRIPTION

Under certain scenarios, active sessions may need to be released. If this need occurs, the sessions can be released from the License Manager through use of the Force Release functionality.

In addition to releasing the sessions from the Session tab in the License Manager, the licenses can be managed by left clicking on a license with active sessions under the Licenses tab.

Note: Once a user session is released, and if there are additional licenses available, the session for the license that was released can be renewed and will remain active. In addition, the releasing of licenses is only permitted for users belonging to the licadmin group.

SETUP

A user session that can be terminated is needed to run this test.

VERSION #1.010

2. TEST

- Step 1. Start the License Manager application in the zone that is applicable for the target session.
- Step 2. Under <Sessions> on the top bar on the License Manager application, you can view the sessions that are currently active in the system.
- Step 3. Choose one of the active sessions to release.
- Step 4. For the session to be released, select <Release> on the right side of the screen.
- Step 5. When the Force Release window appears, select <Yes>.
- Step 6. After the Force Release window disappears, refresh the screen.
- Step 7. Demonstrate that the released license is no longer listed as an active session under the License Manager.

Pass____ Fail____

3.6.8 License Manager – View and Export Licenses

1. DESCRIPTION

The License Manager is used to manage Capacity, Feature, Session, and Trial licenses in the system. The License Manager provides a consolidated view of software licenses in the system.

The License Manager runs on a Zone basis. The system level licenses are contained in the License Manager in the zone that is colocated with the system servers (Eg. UCS) (typically zone 1).

SETUP

No specific setup is required for this test.

VERSION #1.020

2. TEST

- Step 1. Start the License Manager application
- Step 2. Under <Capacity Licenses>, you can view the capacity usage in the system (ex: Trunked Radio User). Note the Purchased Quantity and Used Quantity.
- Step 3. Under <Feature Licenses>, you can view which features have been purchased on the system (ex: Provisioning Manager Interface).
- Step 4. Under <Session Licenses>, you can view the session licenses in the system (ex: Zone Watch). Note the Purchased Quantity and Used Quantity.
- Step 5. Under <Licenses> on the top bar on the License Manager application, you can view the licenses applicable for this system.
- Step 6. Select <Export> in the upper right hand corner of the License Manager application.
- Step 7. When the selector window appears, select <Save> to save the exported file.
- Step 8. Once the file is saved, it can be opened and viewed (ex: Excel) and verify that the exported license file matches the licenses as specified in the License Manager.

Pass____ Fail____



3.7 SYSTEM RELIABILITY FEATURES

3.7.1 Base Station Identification

1. DESCRIPTION

This test will demonstrate that the repeater(s) programmed for Base Station Identification (BSI) operation at every site broadcasts the FCC BSI at predefined intervals (usually 30 minutes). To accomplish this, a service monitor will be set up to monitor the BSI channel of a random site and note that the Base Station Identification is heard.

SETUP

A service monitor will be required to perform this test.

Note: A properly configured subscriber can be used to monitor the frequency for the BSI tones in place of a service monitor.

VERSION #1.030

2. TEST

- Step 1. Choose one site to test for Base Station Identification (BSI).
- Step 2. Setup the service monitor or subscriber to receive the frequency of the BSI channel for the particular site.
- Step 3. Monitor the service monitor until the Base Station Identification is broadcast. Verify that the BSI tones are heard on the monitored frequency.

Pass____ Fail____

System Reliability Features

3.7.2 Station Failure

1. DESCRIPTION

When a base station repeater at one site fails due to hardware problems, the pending call is lost and the trunking controller removes the channel from service system wide. This failure can be created by powering down one base station repeater.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

VERSION #1.010

2. TEST

- Step 1. Power down a voice repeater for any voice channel at SITE 1.
- Step 2. Initiate calls using RADIO-1 to step through all available voice channels.
- Step 3. Verify that the disabled channel is not used at SITE 1.

Pass____ Fail____



3.7.3 Link Failure between MCC 7100/7500 site and Zone Controller

1. DESCRIPTION

This test will demonstrate that the two communication paths between the MCC 7100/7500 Console Site and Zone Controller are redundant and the system will continue uninterrupted if the main path fails. To accomplish this test one of the two NIC connections is removed at the Zone Controller.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

RADIO-2 - TALKGROUP 1

RADIO-2 - SITE - SITE 1

RADIO-3 - TALKGROUP 2

RADIO-3 - SITE - SITE 1

RADIO-4 - TALKGROUP 2

RADIO-4 - SITE - SITE 2

CONSOLE-1 and CONSOLE-2 at the MCC 7100/7500 Console site are affiliated to the TALKGROUP 1 and TALKGROUP 2 talkgroups.

2. TEST

- Step 1. Initiate a Talkgroup Call with RADIO-1 in TALKGROUP 1.
- Step 2. Observe that only RADIO-2, CONSOLE-1 and CONSOLE-2 are able to monitor and respond to the call
- Step 3. Initiate a Talkgroup call with RADIO-3 in TALKGROUP 2.
- Step 4. Observe that only RADIO-4, CONSOLE-1 and CONSOLE-2 are able to monitor and respond to the call.
- Step 5. Remove the Ethernet cable to Link 1 from the NIC on the Zone Controller, this will simulate a Zone Controller to Console Site Link failure.
- Step 6. Observe that the calls on TALKGROUP 1 and TALKGROUP 2 can continue.
- Step 7. Repeat steps 1-6 for the other Zone Controller.
- Step 8. Connect the Ethernet cables to normalize the system.

VERSION #1.010

Pass_____ Fail_____

3.7.4 Redundant Console Site Link Failure

1. DESCRIPTION

Communication between the Master Site and a Remote Console Site can take place over dedicated redundant links. The two links between the Master Site and the Remote Console Site operate in a redundant mode. The system will switch to the backup link if the main LAN or WAN link fails.

Note: The Primary Site Router, if functional, will always be the active router. The Secondary Site Router will only take over when the Primary Site Router is malfunctioning.

SETUP

RADIO-1 - TALKGROUP 1

RADIO-1 - SITE - SITE 1

CONSOLE-1 - TALKGROUP 1

A radio and a Console are required to perform this test (RADIO-1 and CONSOLE-1). Select a Console site with redundant links to the Master Site.

VERSION #1.010

2. TEST

- Step 1. CONSOLE-1 initiates a Talkgroup call on TALKGROUP 1.
- Step 2. Observe that RADIO-1 is able to receive and respond to the call.
- Step 3. Remove the WAN link from the active router (Primary Site Router) at the Remote Console Site.
- Step 4. Initiate a Talkgroup Call with RADIO-1 in TALKGROUP 1.
- Step 5. Observe that CONSOLE-1 is able to receive and respond to the call.
- Step 6. Replace the WAN link connection that was removed in step 4.

Pass____ Fail____



3.7.5 Transmitter Power Failure Shutdown

1. DESCRIPTION

The repeaters can detect a loss or decrease in transmitter output power of all trunked repeaters connected to it. Each trunked repeater contains an internal wattmeter element. Once the forward power has decreased past the threshold set, the repeater instructs the Zone Controller to take the channel out of service. If reflected power increases past the threshold set, the repeater will also instruct the Zone Controller to take the channel out of service.

Once the station threshold has been exceeded and the station taken out of service a 5 minute timer will start. At the timer expiration a transmitter test will start to perform a self check on the station. This self check lasts for 20 seconds. If the station passes the self check it will be placed back into service.

Note: This test should be done on a site with more than 2 channels. Failsoft will occur if the test is done on a 2 channel site.

SETUP

RADIO-1 - TALKGROUP 1

VERSION #1.010

2. TEST

- Step 1. Select a channel to disconnect the transmit antenna connection to the trunked repeater. (This will cause a high VSWR condition)
- Step 2. Key RADIO-1 so that the selected channel is assigned, and verify that the channel disables due to an alarm condition. Verify that this alarm is reported at the Unified Event Manager (UEM).
- Step 3. Wait 30 seconds after the failure then restore the transmit antenna connection to the trunked repeater.
- Step 4. Using the station LEDs, verify that the time it takes from the corrected connection to the station being placed back in service is within 5 minutes.
- Step 5. Verify the Unified Event Manager (UEM) also reports the station being back in service.

Pass____ Fail____

3.7.6 Receiver Interference Shutdown

1. DESCRIPTION

Receiver interference occurs when a repeater receives an unauthorized signal. In order to prevent a disruption of communications, the affected channel will be disabled and removed from the system's pool of available channel resources when the undesired carrier is detected for longer than the time-out period. Once the interfering carrier disappears, the channel is returned to service within approximately 5 minutes. The channel is then enabled.

Note: The default Carrier Malfunction Timeout is 50 seconds. If the default value is to be modified, the change will need to be made in the Unified Network Configurator (UNC) for the channel(s) to be modified.

SETUP

A Service Monitor or configured subscriber is needed to transmit a signal at the receive frequency of a chosen channel.

VERSION #1.010

2. TEST

- Step 1. Using a service monitor, transmit a 1 kHz tone at the receive frequency of any repeater.
- Step 2. Continue to transmit the 1 kHz tone until the controller removes the channel from service. (The Carrier Malfunction Time parameter timer is configurable, default is 50 seconds).
- Step 3. Initiate a Talkgroup Call with RADIO-1 on TALKGROUP 1.
- Step 4. Dekey (allow the channel to end the call) and initiate another Talkgroup Call with RADIO-1. Verify the affected channel is removed from the selection/assignment process by repeating talkgroup calls until the available channels have all been used.
- Step 5. From the Unified Event Manager (UEM), verify channel malfunction due to interfering carrier is indicated.
- Step 6. Remove the interfering signal. Verify the test Channel is returned to service within five minutes and that UEM indicates that the channel is now enabled.
- Step 7. Initiate a Talkgroup Call with RADIO-1 on TALKGROUP 1. Dekey (allow the channel to end the call) and initiate another Talkgroup Call with RADIO-1. Repeat the calls until the test channel has been used.
- Step 8. Verify that RADIO-2 can monitor and respond to the TALKGROUP 1 call on the channel that has returned to service.

Pass____ Fail____



3.8 SIGNOFF CERTIFICATE

By their signatures below, the following witnesses certify they have observed the system Acceptance Test Procedures.

Signatures

WITNESS:

_____	Date: _____
-------	-------------

Please Print Name: _____

Initials:

Please Print Title: _____

WITNESS:

_____	Date: _____
-------	-------------

Please Print Name: _____

Initials:

Please Print Title: _____

WITNESS:

_____	Date: _____
-------	-------------

Please Print Name: _____

Initials:

Please Print Title: _____



TRAINING

4.1 OVERVIEW

Motorola Solutions understands that successful implementation and use of your communications system depends on effective training. We have developed a training proposal for DTE to ensure a comprehensive understanding of your proposed system and all user equipment. We are leveraging over 85 years of training experience working with customers just like you to provide recommendations for your consideration. The training proposal detailed in the following pages incorporates customer feedback coupled with a best practices systematic approach to produce effective course delivery and content.

Our commitment to DTE is to provide unsurpassed services that ensure the equipment operates efficiently for the life of the system. To do so, we directly train your personnel to utilize the system to its maximum potential.

DTE personnel will gain in-depth understanding of the power of your new system through education and proficient daily use. Our high-quality training focuses on student needs. The training is complemented by detailed documentation and available continuing education programs.

We will collaborate with DTE to develop a final customized training plan that fits your needs. Our goal is to insure system administrators, technicians and end users are skilled in using your new system.



4.1.1 Training Approach

Our training solutions deliver a combination of online training and field based instructor-led training in classrooms at DTE locations using operational equipment. Motorola Solutions will employ knowledgeable and experienced instructors to deliver well-designed courseware and integrated lab activities.

Training is based upon several key criteria:

- Course design is driven by an analysis of student needs. It focuses on specific application rather than theory.
- Learning objectives are based upon what students need to accomplish on the job.
- Hands-on lab opportunities using DTE specific job aids are incorporated to maximize learning and retention.

Our instructors bring invaluable experience and knowledge of customer communication solutions into their training approach. This gives them better insight and understanding into the practical aspects of

DTE manager, technician and end user job functions. Each instructor has the proven ability to communicate with a novice as well as expert personnel.



4.1.2 Proposed Courses

Motorola Solutions has identified the following course(s) that are necessary to achieve the training goals for DTE. Course description files for the recommended courses are provided in the matrix below. Class delivery for instructor-led courses in the field will be tailored for your system and features.


Specifically, our proposed training plan addresses the following categories as identified in your request for proposal:

- System Administrators
- Maintenance Technicians (Factory)
- Console Supervisors and Trainers

It is recommended that participants bring their laptop computers for all system administrator and technician classes.



Planning Stage Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
ASTRO 25 Systems Fleetmapping Workshop (Instructor-led)	System Managers and Technicians	1	4.5 days	MI	Early in Planning Stage	Up to 12
Course Synopsis: This workshop addresses topics necessary for the effective planning and mapping of an ASTRO 25 IV&D radio system. During this course, the participants will learn about ASTRO 25 features, capabilities, and restrictions in order to effectively plan for a new or upgraded ASTRO 25 system.						 RDS1017. ASTRO 25 Systems Fleetmapping


Course Description


ASTRO 25 Systems Fleetmapping Workshop RDS1017	
Duration:	4.5 days
Delivery Method:	ILT – Instructor-led training
Target Audience:	Pre-Sale System Owners, Planners, Administrators, and Technicians
Course Synopsis:	This workshop addresses topics necessary for the effective planning and mapping of an ASTRO 25 IV&D radio system. During this course, the participants will learn about ASTRO 25 features, capabilities, and restrictions in order to effectively plan for a new or upgraded ASTRO 25 system.
Prerequisite:	None
Course Objectives:	After completing the course, the participant will be able to: <ul style="list-style-type: none"> ▪ Define what a fleetmap is and why one is needed. ▪ Understand the methodologies used to configure radio users groups with the goal of optimizing the system resources. ▪ Enable participants to knowledgeably assist with fleetmapping decisions. ▪ Discuss frequency band plan, organization, and management. ▪ Describe basic planning requirements. ▪ Complete worksheets required to create a fleetmap based on sample operational requirement information.
Course Modules:	Module 1: Introduction
	Module 2: ASTRO 25 System Architecture 2-1: Overview 2-2: Supported Architecture Types 2-3: ASTRO 25 IP Integration 2-4: Basic Components 2-5: Characteristics 2-6: Network Management Applications

ASTRO 25 Systems Fleetmapping Workshop RDS1017	
	2-7: Radio Frequency Subsystems 2-8: Repeater Site 2-9: Multisite Subsystems – Simulcast
	Module 3: Frequency Band Plan Management 3-1: Considerations and Warnings 3-2: Overview 3-3: Elements 3-4: Foreign System Frequency Plan 3-5: Channel Assignment Methods 3-6: UNC Wizard 3-7: Channel Access
	Module 4: Fleetmapping Technical Overview 4-1: Set Up 4-2: System Organization 4-3: Benefits 4-4: Talkgroups/Multi-groups/Agency groups 4-5: Radio Users 4-6: Talkgroups in an Organization 4-7: Organizing Fleetmap Tasks 4-8: Organizing Fleetmap Other Factors 4-9: Identifying Radio Users 4-10: Identifying Data Services Users 4-11: Radio Users into Talkgroups 4-12: Radio Users and All Assigned Talkgroups 4-13: Talkgroups in Multi-groups 4-14: Multi-groups in Agency Groups 4-15: Assigning IDs and Aliases 4-16: Creating ID Ranges 4-17: Identifying Talkgroup, Multi-group, and Agency Group IDs 4-18: Identifying Console IDs 4-19: Console ID Assignment 4-20: Alias Assignment 4-21: Home Zones 4-22: Home Location Register (HLR) 4-23: Visitor Location Register (VLR) 4-24: HLR and VLR per Zone 4-25: Priority Levels 4-26: Secure Keys
	Module 5: Fleetmapping Configuration 5-1: Feature Assignment 5-2: Home Zone Assignments 5-3: Data Services 5-4: Secure Voice Requirements 5-5: System Access 5-6: User Access 5-7: Hierarchy of System Management Users

ASTRO 25 Systems Fleetmapping Workshop RDS1017	
	5-8: System Management 5-9: Database Access 5-10: Subscriber Programming 5-11: Radio Programming 5-12: Subscriber Ranges 5-13: Subscriber Range Assignment 5-14: Additional Considerations
	Module 6: Fleetmapping Operation 6-1: ASTRO 25 System Checklist 6-2: Contingency Planning 6-3: Escalation Plan 6-4: Additional Contingency Planning
	Module 7: Worksheets 7-1: List of Fleetmapping Worksheets 7-2: Current and Future Equipment Quantities Worksheet 7-3: Available Sites Worksheet 7-4: Individual Radio Users Worksheet 7-5: Serial Number to Radio ID Worksheet 7-6: Radio User to Radio ID Worksheet 7-7: Talkgroup IDs and Aliases Worksheet 7-8: Multi-groups and Associated Talkgroups Worksheet 7-9: Agency Groups and Associated Multi-groups 7-10: Radio Users Assigned to Talkgroups Worksheet 7-11: Communications and Radio Feature Mapping Worksheet 7-12: Console IDs Worksheet 7-13: Secure Keys Worksheet 7-14: Talkgroup Matrix Worksheet 7-15: Lab - Create a Fleetmap 7-16: Course Conclusion

Maintenance Technician Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
APX CPS Programming and Template Building (On-line; Instructor Led)	Radio Technicians	1	5 days (2.5 hrs per day)	Online	Prior to programming radios	1
Course Synopsis: The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and mobile.						 APX CPS Programming and Te

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
APX Technical Subscriber Academy (Instructor-led)	Radio Technicians	1	5 days	Factory Plantation, FL	Prior to programming radios	1
Course Synopsis: This course focuses on the knowledge required for a 2-way Radio Technician working in a communication environment or using the family of APX radios in the field. The course is specifically designed to provide significant amounts of hands-on, scenario based labs around configuration and troubleshooting. Key Loading and Management, Encryption, Over-The Air Programming and Mobile Radio Installation are some of the topics that will be covered in detail for both mobile and portable radios.						 APX Technical Subscriber Academy

Course Descriptions

APX CPS Programming and Template Building	
Duration:	2 Days
Delivery Method:	ILT – Instructor-led training
Target Audience:	Radio Technicians, System Managers and anyone responsible for programming APX subscriber radios
Course Synopsis:	The APX CPS Programming and Template Building course provides communications management personnel and technicians with the knowledge and training necessary to build templates and program APX subscriber radio's in the most efficient way possible. The content, parameters and exercises demonstrated in this class apply to the APX portable and APX mobile.
Prerequisite:	Knowledge of the basic features and options of two-way radios, and the basic concepts of conventional and trunking systems
Course Objectives:	After completing this course, the student will be able to: <ul style="list-style-type: none"> ▪ Build APX templates using the APX Customer Programming Software (CPS) Program the specific parameters related to various radio system configurations: Conventional, Single Site Trunking, Simulcast, SmartZone, ASTRO 25 and ASTRO 25 X2 ▪ Demonstrate detailed knowledge of APX CPS navigation, tools, options and features that make efficient programming of the radio possible ▪ Demonstrate a complete understanding of APX CPS efficiency tools, such as Cloning, Drag and Drop, Codeplug Comparison, Radio Flashing, Advance System Key Administration and others



APX CPS Programming and Template Building	
Course Modules:	<ul style="list-style-type: none"> ▪ Introduction to APX Radio ▪ Introduction to APX CPS ▪ APX CPS Install, Setup and Configuration ▪ Navigating APX CPS ▪ APX CPS Data Transfer including POP25/OTAP ▪ Understanding and Interpreting Radio Information ▪ Detailed Review of Codeplug Contents ▪ APX Conventional Codeplug Build ▪ APX Type II Trunking Codeplug Build ▪ APX ASTRO 25 Trunking Codeplug Build ▪ Building Scan List ▪ Additional/Advanced CPS Functionality

Course Descriptions




APX Technical Subscriber Academy	
Duration:	5 Days
Delivery Method:	ILT – Instructor-led training
Target Audience:	Radio technicians
Course Synopsis:	<p>This course focuses on the knowledge required for a 2-way Radio Technician working in a communication environment or using the family of APX radios in the field. The course is specifically designed to provide significant amounts of hands-on, scenario based labs around configuration and troubleshooting. Key Loading and Management, Encryption, Over-The Air Programming and Mobile Radio Installation are some of the topics that will be covered in detail for both mobile and portable radios.</p>
Prerequisite:	<p>Prerequisites:</p> <p>Completion of the following courses:</p> <ul style="list-style-type: none"> ▪ APX CPS Programming and Template Building Overview (APX7001-V) <p>Completion of the following courses or equivalent experience in Radio Communications:</p> <ul style="list-style-type: none"> ▪ Communication Systems Concepts (NST021) ▪ Radio Systems Overview (RCS002-E or Test out RCS002-T) ▪ Theory of Radio Operations (RCS003-E or TEST out RCS003-T)



APX Technical Subscriber Academy	
Course Objectives:	<p>After completing this course, the student will be able to:</p> <ul style="list-style-type: none"> ▪ Distinguish between the features and specifications of APX portable and mobile radios ▪ Verify the correct operations of the APX portable and mobile radios ▪ Maintain and troubleshoot an APX portable and mobile radios Disassemble and reassemble the radio using the documented procedures ▪ Verify the housing integrity of an APX portable radio ▪ Flash upgrade an APX portable and mobile radio
Course Modules:	<ul style="list-style-type: none"> ▪ APX Radio Introduction ▪ APX Radio Performance Checks ▪ APX Radio Alignment ▪ APX Radio Theory Of Operation ▪ Radio Disassembly / Reassembly ▪ Vacuum Testing For Submergibility ▪ Mobile Radio Installation and Configuration ▪ Advanced Customer Programming Software ▪ Radio Troubleshooting



Console Supervisor and Trainers Training Plan

Course Title	Target Audience	Sessions	Duration	Location	Date	Participants
MCC7500/7100Console Operator and Admin 5 Training consoles (Instructor-led)	Dispatch Supervisors (Per RFP)	1 (8 hr session)	1 session per day	MI	Prior to cutover	10
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. Admin Course Synopsis: This course provides participants with the knowledge and skills to manage and utilize the MCC7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens.						 MCC7500 Operator.DOC  MCC7500 Supervisor.DOC
MCC7500/7100Console Operator Train-the-Trainers 5 Training consoles (Instructor-led)	Dispatch Trainers	1 (6 hr session)	1 day	MI	Prior to cutover	10
Operator Course Synopsis: This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. Trainers will also be taught how to use the tailored training aids to train staff.						 MCC7500 Operator.DOC

Course Descriptions

MCC7500/7100 Console Operator Train-the-Trainers	
Duration:	4 hours – Full Course 2 hours - T-t-T
Delivery Method:	ILT - Instructor-led training
Target Audience:	Dispatch Console Operators, Supervisors, System Administrators, and Support Personnel
Course Synopsis:	This course provides participants with an introduction to the dispatch console, its basic operation and tailored job aids which will be available for assistance in operation. Through facilitation and hands-on activities, the user learns how to perform common tasks associated with the console operation. Trainers will also learn how to use the tailored tools to train staff.
Prerequisite:	None
Course Objectives:	<ul style="list-style-type: none"> • Perform basic operational tasks of the dispatch console • Utilize the provided job aids to perform specific tasks associated with the console • Understand a high level view of the system configuration • High-level overview of the customer system configuration • General console operation • Proper operating procedures for specific customer features
Course Modules:	<ul style="list-style-type: none"> • Overview • Communicating with Radios • Advanced Signaling Features • Resource Groups • Working with Configurations • Working with Aux IOs • Troubleshooting • Tailored training tools



MCC7500/7100 Console ADMIN for Supervisor	
Duration:	4 hours Operator, plus 4 hours ADMIN – Full Course
Delivery Method:	ILT - Instructor-led training
Target Audience:	Dispatch Supervisors and System Administrators
Course Synopsis:	This course provides participants with the knowledge and skills to manage and utilize the MCC7500 console administrator functions. Through facilitation and hands-on activities, the participant learns how to customize the console screens.
Prerequisite:	None
Course Objectives:	<ul style="list-style-type: none"> • Understand the menu items and tool bar icons • Edit folders, multi-select/patch groups, auxiliary input output groups, windows and toolbars • Add/delete folders
Course Modules:	<ul style="list-style-type: none"> • Introduction • Configurations • Folders and Resource Setup • Customizing Folders • Auto Starting the MCC 7500 Dispatch Console • Editing Preferences • Configuring the Toolbar • Setting Up Aux IOs • Resource Groups

WARRANTY

5.1 MOTOROLA SYSTEM SUPPORT

Our standard commercial warranty covers on-site response during normal business hours; it also provides for the repair or replacement of defective hardware components.

In addition to the standard commercial warranty, specially selected support services will be delivered in conjunction with the one-year warranty period. After the warranty period expires, these customized support services may be purchased at your option under a maintenance and support agreement. The customized warranty support services may include the following additional services:

- Infrastructure Repair.
- Dispatch Service and Call Management.
- Network Security Monitoring.
- Security Upgrade Services (SUS).
- Technical Support.
- On-Site Infrastructure Response (24×7).
- Network Preventative Maintenance.
- Repair Service Advantage (Subscriber Repair).



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EQUIPMENT LIST

The proposed system solution and services for DTE Energy will be....

SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
			ASTRO 25 M Core Upgrade (7.15) - DTE Console Addition Licenses
MASTER LICENSE	1	SQM01SUM0273A	MASTER SITE CONFIGURATION
MASTER LICENSE	1	CA02629AA	ENH: EXPAND 7.15
MASTER LICENSE	2	UA00156AA	ENH: MCC 7500 and/or MCC 7100 Console Licenses (QTY 5)
MASTER LICENSE	1	CA01316AA	ADD: UNC ADDITIONAL DEVICE LICENSES (QTY 10)
MASTER LICENSE	2	UA00165AA	ADD: RADIO AUTH 500 USER LIC
			88 STANDALONE GTR BASE RADIOS ADDED TO EXISTING ASR SITES THAT WILL TIE TO THE CORE
			NETWORKING COMPONENTS ASSUMED TO HAVE SUFFICIENT PORTS TO ACCOMMODATE EXTRA CH
			SWITCH INCLUDED only for SITES that go ABOVE 7 or MORE DUE TO DTE CH addition
ASR SITE	88	T7039	GTR 8000 Base Radio
ASR SITE	88	CA00855AA	ADD:700/800MHZ
ASR SITE	88	X591AE	ENH: ASTRO 25 SITE REPEATER SW
ASR SITE	88	X153AW	ADD:RACKMOUNT HARDWARE
Flatpack	47	DS241115105	Flatpack Rectifier ,48,/2000HE
NETWORK	29	CLN1856	2620-24 ETHERNET SWITCH
			Trak 8835 (for sites that increase to 7 or more channels)
TRAK	29	DSTRAK88353M	GPS CLOCK, 10MHZ, RUBIDIUM, 48V INCL ANT AND 100' COAX W/DONGLESNMPV3
TRAK	29	DSTRAK4008245101	MOUNTING SHELF FOR 8835 GPS CLOCK
TRAK	29	DSTRAKP002111KIT	ENHANCED FILTER ANTENNA KIT (N CONN) FOR TRAK 9100 AND 8835
TRAK	1450	L1700	FSJ1-50A CABLE: 1/4" SUPERFLEX POLY JKT PER FOOT
TRAK	29	DSTRAK4702354	LIGHTENING/SURGE SUPPRESSOR (N-N) FOR TRAK GPS
			Rack(2504,1202 racks full and assuming DTE goes first , there is room in each site for 1 -2 stations,1Sw1 TRAK unit)
ASR SITE	2	BLN6200	AC POWER STRIP, 6 OUTLET
ASR SITE	2	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN

SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
ASR SITE	2	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			RF COMPONENTS FOR ALL SITES (RX components to be reused)
ASR SITE	34	DSWIJD86204S	COMB WAV-G 851-869 4CH 7/16 ANT, 150 KHZ MIN SEP BETWEEN CHANNELS
			TX Antenna Assembly (combined count for 34 sites)
RF	34	DSDB812KEXT	DB812KE-XT FIBERGLASS OMNI ANT 12DB
RF	510	L1705	LDF4-50A CABLE: 1/2" LDF HELIAX POLY JKT PER FOOT
RF	68	DDN1090	L4TDM-PSA 7-16 DIN MALE PS FOR 1/2 IN CABLE
RF	68	TDN9289	221213 CABLE WRAP WEATHERPROOFING
RF	16150	L3405	AVA7-50 CABLE: 1 5/8" AVA HELIAX POLY JKT PER FOOT
RF	68	DDN9383	AL7DF-PSA 1-5/8" 7-16 DIN FEMALE POSITIVE STOP CONNECTOR
RF	272	DSSG15806B2A	SG158-06B2A 1-5/8" SUREGROUND GROUNDING
RF	102	DSL7SGRIP	L7SGRIP 1-5/8" SUPPORT HOIST GRIP
RF	510	TDN6949	42396A-2 1-5/8" CABLE HANGER KIT 10 PACK
RF	34	DSTSXD FMBF	RF SPD, 698-2700MHZ DC BLOCK HIGH POWER, DIN FEMALE/MALE BIDIRECTIONAL
RF	34	DSGSAKITD	GROUND STRAP KIT - DIN
RF	850	L1705	LDF4-50A CABLE: 1/2" LDF HELIAX POLY JKT PER FOOT
RF	68	DDN1090	L4TDM-PSA 7-16 DIN MALE PS FOR 1/2 IN CABLE
RF	34	DDN9743	TK-TW TORQUE WRENCH KIT FOR 7-16 DIN & TYPE N COUPLING NUTS
			4 CONSOLE SITES NETWORKING COMPONENTS
CONSOLE	4	SQM01SUM0205	GGM 8000 GATEWAY
CONSOLE	4	CA01616AA	ADD: AC POWER
CONSOLE	4	CA02087AA	ADD: ENCRYPTION 7.12 and later
CONSOLE	4	CA02134AA	ADD: COMMON CRITERIA
CONSOLE	4	CLN1856	2620-24 ETHERNET SWITCH
			GAS DISPATCH MAIN
M75DSP#001	1	B1905	MCC 7500 ASTRO 25 SOFTWARE
M75DSP#001	1	B1933	MOTOROLA VOICE PROCESSOR MODULE
M75DSP#001	1	CA01642AA	ADD: MCC 7500 BASIC CONSOLE FUNCTIONALITY SOFTWARE LICENSE
M75DSP#001	1	CA01643AA	ADD: MCC 7500 / MCC 7100 TRUNKING OPERATION
M75DSP#001	1	CA01644AA	ADD: ADVANCED CONVENTIONAL OPERATION
M75DSP#001	1	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN
M75DSP#001	1	DSTG191	TECH GLOBAL EVOLUTION SERIES 19INCH NON TOUCH
M75DSP#001	1	TT2833	COMPUTER, Z440 WORKSTATION WINDOWS 7



SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
M75DSP#001	1	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG
M75DSP#001	2	B1912	MCC SERIES DESKTOP SPEAKER
M75DSP#001	1	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE
M75DSP#001	2	B1913	MCC SERIES HEADSET JACK
M75DSP#001	2	RLN6098	HDST MODULE BASE W/PTT, 15' CBL
M75DSP#001	0	RMN5080B	SUPRAPLUS NC DUAL MUFF HEADSET
M75DSP#001	1	DSTWIN6328A	PROVIDES ONE DUAL PEDAL FOOTSWITCH FOR USE WITH MOTOROLA MCC 7500 DISP
M75DSP#001	1	T7885	MCAFEЕ WINDOWS AV CLIENT
M75DSP#001	1	DDN2089	DUAL IRR SW USB HASP WITH LICENSE (V47)
M75DSP#001	1	DDN2134	SOUND BLASTER AUDIGY FX PCIE SOUND CARD
M75DSP#001	1	CDN6673	CREATIVE LABS INSPIRE A60
			ADDITIONAL SITE RACK AND SURGE
M75DSP#001	1	TRN7343	SEVEN AND A HALF FOOT RACK
M75DSP#001	1	BLN6200	AC POWER STRIP, 6 OUTLET
M75DSP#001	1	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN
M75DSP#001	1	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			ASIS (IP LOGGER NOT INCLUDED IN THE CURRENT LIST)
M75DSP#001	1	B1933	MOTOROLA VOICE PROCESSOR MODULE
M75DSP#001	1	CA00288AB	ADD: MCC 7500 ARCHIVING INTERFACE SERVER SOFTWARE LICENSE
M75DSP#001	1	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN
M75DSP#001	1	T7885	MCAFEЕ WINDOWS AV CLIENT
M75DSP#001	1	TT2833	COMPUTER, Z440 WORKSTATION WINDOWS 7
M75DSP#001	1	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG
M75DSP#001	1	DDN9748	19 INCH BLACK SHELF
			GAS DISPATCH DISASTER RECOVERY
M75DSP#001	1	B1933	MOTOROLA VOICE PROCESSOR MODULE
M75DSP#001	1	CA01642AA	ADD: MCC 7500 BASIC CONSOLE FUNCTIONALITY SOFTWARE LICENSE
M75DSP#001	1	CA01643AA	ADD: MCC 7500 / MCC 7100 TRUNKING OPERATION
M75DSP#001	1	CA01644AA	ADD: ADVANCED CONVENTIONAL OPERATION
M75DSP#001	1	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN
M75DSP#001	1	DSTG191	TECH GLOBAL EVOLUTION SERIES 19INCH NON TOUCH
M75DSP#001	1	TT2833	COMPUTER, Z440 WORKSTATION WINDOWS 7
M75DSP#001	1	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG
M75DSP#001	2	B1912	MCC SERIES DESKTOP SPEAKER
M75DSP#001	1	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE

SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
M75DSP#001	2	B1913	MCC SERIES HEADSET JACK
M75DSP#001	2	RLN6098	HDST MODULE BASE W/PTT, 15' CBL
M75DSP#001	0	RMN5080B	SUPRAPLUS NC DUAL MUFF HEADSET
M75DSP#001	1	DSTWIN6328A	PROVIDES ONE DUAL PEDAL FOOTSWITCH FOR USE WITH MOTOROLA MCC 7500 DISP
M75DSP#001	1	T7885	MCAFFEE WINDOWS AV CLIENT
M75DSP#001	1	DDN2089	DUAL IRR SW USB HASP WITH LICENSE (V47)
M75DSP#001	1	DDN2134	SOUND BLASTER AUDIGY FX PCIE SOUND CARD
M75DSP#001	1	CDN6673	CREATIVE LABS INSPIRE A60
			ADDITIONAL SITE RACK AND SURGE
M75DSP#001	1	TRN7343	SEVEN AND A HALF FOOT RACK
M75DSP#001	1	BLN6200	AC POWER STRIP, 6 OUTLET
M75DSP#001	1	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN
M75DSP#001	1	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			SERVICE DISPATCH DISTRIBUTION MAIN
M75DSP#001	1	B1905	MCC 7500 ASTRO 25 SOFTWARE
M75DSP#001	2	B1933	MOTOROLA VOICE PROCESSOR MODULE
M75DSP#001	2	CA01642AA	ADD: MCC 7500 BASIC CONSOLE FUNCTIONALITY SOFTWARE LICENSE
M75DSP#001	2	CA01643AA	ADD: MCC 7500 / MCC 7100 TRUNKING OPERATION
M75DSP#001	2	CA01644AA	ADD:ADVANCED CONVENTIONAL OPERATION
M75DSP#001	2	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN
M75DSP#001	2	DSTG191	TECH GLOBAL EVOLUTION SERIES 19INCH NON TOUCH
M75DSP#001	2	TT2833	COMPUTER, Z440 WORKSTATION WINDOWS 7
M75DSP#001	2	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG
M75DSP#001	4	B1912	MCC SERIES DESKTOP SPEAKER
M75DSP#001	2	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE
M75DSP#001	4	B1913	MCC SERIES HEADSET JACK
M75DSP#001	4	RLN6098	HDST MODULE BASE W/PTT, 15' CBL
M75DSP#001	0	RMN5080B	SUPRAPLUS NC DUAL MUFF HEADSET
M75DSP#001	2	DSTWIN6328A	PROVIDES ONE DUAL PEDAL FOOTSWITCH FOR USE WITH MOTOROLA MCC 7500 DISP
M75DSP#001	2	T7885	MCAFFEE WINDOWS AV CLIENT
M75DSP#001	2	DDN2089	DUAL IRR SW USB HASP WITH LICENSE (V47)
M75DSP#001	2	DDN2134	SOUND BLASTER AUDIGY FX PCIE SOUND CARD
M75DSP#001	2	CDN6673	CREATIVE LABS INSPIRE A60
			ADDITIONAL SITE RACK AND SURGE(TBD)
M75DSP#001	1	TRN7343	SEVEN AND A HALF FOOT RACK



SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
M75DSP#001	1	BLN6200	AC POWER STRIP, 6 OUTLET
M75DSP#001	1	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN
M75DSP#001	1	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			SERVICE DISPATCH DISTRIBUTION DISASTER RECOVERY SITE
M75DSP#001	2	B1933	MOTOROLA VOICE PROCESSOR MODULE
M75DSP#001	2	CA01642AA	ADD: MCC 7500 BASIC CONSOLE FUNCTIONALITY SOFTWARE LICENSE
M75DSP#001	2	CA01643AA	ADD: MCC 7500 / MCC 7100 TRUNKING OPERATION
M75DSP#001	2	CA01644AA	ADD:ADVANCED CONVENTIONAL OPERATION
M75DSP#001	2	CA00140AA	ADD: AC LINE CORD, NORTH AMERICAN
M75DSP#001	2	DSTG191	TECH GLOBAL EVOLUTION SERIES 19INCH NON TOUCH
M75DSP#001	2	TT2833	COMPUTER, Z440 WORKSTATION WINDOWS 7
M75DSP#001	2	T7449	WINDOWS SUPPLEMENTAL TRANS CONFIG
M75DSP#001	4	B1912	MCC SERIES DESKTOP SPEAKER
M75DSP#001	2	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE
M75DSP#001	4	B1913	MCC SERIES HEADSET JACK
M75DSP#001	4	RLN6098	HDST MODULE BASE W/PTT, 15' CBL
M75DSP#001	0	RMN5080B	SUPRAPLUS NC DUAL MUFF HEADSET
M75DSP#001	2	DSTWIN6328A	PROVIDES ONE DUAL PEDAL FOOTSWITCH FOR USE WITH MOTOROLA MCC 7500 DISP
M75DSP#001	2	T7885	MCAFFEE WINDOWS AV CLIENT
M75DSP#001	2	DDN2089	DUAL IRR SW USB HASP WITH LICENSE (V47)
M75DSP#001	2	DDN2134	SOUND BLASTER AUDIGY FX PCIE SOUND CARD
M75DSP#001	2	CDN6673	CREATIVE LABS INSPIRE A60
			ADDITIONAL SITE RACK AND SURGE
M75DSP#001	1	TRN7343	SEVEN AND A HALF FOOT RACK
M75DSP#001	1	BLN6200	AC POWER STRIP, 6 OUTLET
M75DSP#001	1	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN
M75DSP#001	1	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			CRITICAL DISPATCH SITE SPARES
M75DSP#001	1	B1912	MCC SERIES DESKTOP SPEAKER
M75DSP#001	1	B1914	MCC SERIES DESKTOP GOOSENECK MICROPHONE
M75DSP#001	1	B1913	MCC SERIES HEADSET JACK
M75DSP#001	1	B1934	MCC 7500 VOICE PROCESSOR MODULE FRU
M75DSP#001	1	CLN1856	2620-24 ETHERNET SWITCH
M75DSP#001	1	SQM01SUM0205	GGM 8000 GATEWAY

SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
M75DSP#001	1	CA01616AA	ADD: AC POWER
M75DSP#001	1	CA02087AA	ADD: ENCRYPTION 7.12 and later
M75DSP#001	1	CA02134AA	ADD: COMMON CRITERIA
			APX 4000 MODEL 2 PORTABLES
			Std Battery ,Std Antenna, Std Belt Clip,software key , no data optionsm,only single unit chargers
APXPOR#001	25	H51UCF9PW6 N	APX 4000 7/800 MHZ MODEL 2 PORTABLE
APXPOR#001	25	QA04865	ADD: TWO KNOB CONFIGURATION
APXPOR#001	25	QA02756	ENH: 3600 OR 9600 TRUNKING BAUD SIN
APXPOR#001	0	Q629	ENH: AES ENCRYPTION
APXPOR#001	3	Q157	ADD: APX DATA CABLE
APXPOR#001	25	H885BK	ADD: 3 YEAR SERVICE FROM THE START LITE
APXPOR#001	25	WPLN4232A	CHARGER, SINGLE-UNIT, IMPRES, 1.25A, 115VAC, US/NA
APXPOR#001	25	HMN4104B	IMPRES RSM DSPLY W JACK, W CHNL
APXPOR#001	1	HKVN4289A	SOFTWARE,APX CPS DOWNLOAD - CURRENT VERSION
			APX4500 MOBILES IN SE MICHIGAN
APXMOB#001	300	M22URS9PW1 N	APX4500 7/800
APXMOB#001	300	QA02756	ADD: 3600 OR 9600 TRUNKING BAUD SINGLE SYSTEM
APXMOB#001	300	GA00804	ADD: APX O2 CONTROL HEAD (Green)
APXMOB#001	300	G444	ADD: APX CONTROL HEAD SOFTWARE
APXMOB#001	300	G66	ADD: DASH MOUNT
APXMOB#001	300	W484	ALT: ANT 3DB GAIN 762-870MHZ
APXMOB#001	300	W22	ADD: PALM MICROPHONE
APXMOB#001	300	G831	ADD: SPKR 15W WATER RESISTANT
	300	G24	ADD: 3 YEAR SERVICE FROM THE START LITE
APXMOB#001	6	HKN6184C	CABLE CH, PROGRAMMING,USB
			APX4500 MOBILES IN GRANDRAPIDS
APXMOB#001	380	M22URS9PW1 N	APX4500 7/800
APXMOB#001	380	QA02756	ADD: 3600 OR 9600 TRUNKING BAUD SINGLE SYSTEM
APXMOB#001	380	GA00804	ADD: APX O2 CONTROL HEAD (Green)
APXMOB#001	380	G444	ADD: APX CONTROL HEAD SOFTWARE
APXMOB#001	380	G66	ADD: DASH MOUNT
	380	G24	ADD: 3 YEAR SERVICE FROM THE START LITE
APXMOB#001	380	W484	ALT: ANT 3DB GAIN 762-870MHZ
APXMOB#001	380	W22	ADD: PALM MICROPHONE
APXMOB#001	380	G831	ADD: SPKR 15W WATER RESISTANT
APXMOB#001	6	HKN6184C	CABLE CH, PROGRAMMING,USB



SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
			APX6500 Control Stations (Locations TBD, no control station combiners/no racks included)
APXCS#001	10	M25URS9PW1 N	APX6500 7/800 MHZ MID POWER MOBILE
APXCS#001	10	G806	ADD: ASTRO DIGITAL CAI OPERATION
APXCS#001	10	G51	ADD:SMARTZONE OPERATION APX6500
APXCS#001	10	G361	ADD: P25 TRUNKING SOFTWARE
APXCS#001	10	GA00804	ADD: APX O2 CONTROL HEAD (Grey)
APXCS#001	10	G444	ADD: APX CONTROL HEAD SOFTWARE
APXCS#001	10	G66	ADD: DASH MOUNT
APXCS#001	10	DS8A03F36U-N	800 MHz Omni Fiberglass 6 dBd Antenna
APXCS#001	10	W382	ADD: CONTROL STATION DESK GCAI MIC
APXCS#001	10	G24	ADD: 3 YEAR SERVICE FROM THE START LITE
APXCS#001	10	G91	ADD: CONTROL STATION POWER SUPPLY
APXCS#001	10	W665	ADD: CONTROL STATION OPERATION
APXCS#001	10	G142	ADD: NO SPEAKER NEEDED
APXCS#001	10	G89	ADD: NO RF ANTENNA REQUIRED
APXCS#001	10	HLN6042	MOBILE DESK TRAY
APXCS#001	10	HPN4007C	PS 14V 10A 117/240 VAC
APXCS#001	1	HKVN4289A	SOFTWARE,APX CPS DOWNLOAD - CURRENT VERSION
			6 Site SIMULCAST - Single CH ADD ON (ESTABLISHED SITES- 6 sites with collocated prime)
			The existing Circuit Based Simulcast system is assumed to have 1 ASTROTAC comparator spare to use for DTE. When used
			GTR can be ordered with circuit simulcast option. As of now GTR has IP simulcast and future ready GCM IP comparator
PRM#001	1	T7321	GCM 8000 COMPARATOR
PRM#001	1	CA01183AA	GCM 8000 COMPARATOR
PRM#001	1	CA01185AA	ADD: IP BASED MULTISITE OPERATION
PRM#001	1	X153AW	ADD: RACK MOUNT HARDWARE
			6 SITE - SINGLE CHANNEL ADD SIMULCAST CHANNELS. Existing Site has 2 STR 6 pack that can accommodate 3 more channels at each of the site for Tx combiners, RX side has 16 channel multicoupler and antenna assembly that can be reused Current load at these 9 channels. DTE channel addition will increase the site to 10 channel site SRU card in existing channel banks can accommodate up to 10 channels. So if DTE goes first, no SRU card is required at these sites.
PRM#001	6	T7039	GTR 8000 Base Radio
PRM#001	6	CA00855AA	ADD:700/800MHZ
PRM#001	6	CA01193AA	ADD:ASTRO IP MULTISITE OPERATION
PRM#001	6	X153AW	ADD:RACKMOUNT HARDWARE

SUB SYS ID	QTY	NOMENCLATURE	DESCRIPTION
Flatpack	6	DS241115105	Flatpack Rectifier ,48,/2000HE
			RACK(Each site requires one RACK by default)
PRM#001	6	TRN7343	SEVEN AND A HALF FOOT RACK
PRM#001	6	BLN6200	AC POWER STRIP, 6 OUTLET
PRM#001	6	DSTSJ100BT	SPD, RJ-48 8 PIN, 10/100 BASE T TSJ PROTECTS/PASSES ON ALL 8 PIN
PRM#001	6	DSTSJADP	RACK MOUNT GROUND BAR, 19 IN FOR TSJ AND WPH SERIES DATA SPDS
			PRIME SITE SPARES TBD
PRM#001	1	DLN6895	FRU: PA 7/800 MHz
PRM#001	1	DLN6883	FRU: XCVR 7/800 MHZ V2 W/OPT CARD
PRM#001	1	DLN6455	CONFIGURATION/SERVICE SOFTWARE
PRM#001	1	DLN6898	FRU: FAN MODULE
PRM#001	1	DLN6709	GTR/GPW OPTION CARD
	1	DLN6781	FRU: POWER SUPPLY



SECTION 7

PRICING

Project Total	\$7,760,417.80



APPENDIX

Motorola has included the following documentation in this section:

- MCC7500 Brochure
- MCC7500 IP Console Spec Sheet
- ASTRO G Series Data Sheet
- APX4000 Data Sheet
- APX4500 Data Sheet



COMMUNICATIONS SYSTEM AGREEMENT

DTE Energy/Motorola Solutions Communications System Agreement

Motorola Solutions, Inc. ("Motorola") and DTE Energy ("Customer") enter into this "Agreement," pursuant to which Customer will purchase and Motorola will sell the System, as described below. Motorola and Customer may be referred to individually as a "Party" and collectively as the "Parties." For good and valuable consideration, the Parties agree as follows:

Section 1 EXHIBITS

The exhibits listed below are incorporated into and made a part of this Agreement. In interpreting this Agreement and resolving any ambiguities, the main body of this Agreement takes precedence over the exhibits and any inconsistency between Exhibits A through F will be resolved in their listed order.

Exhibit A	Motorola "Software License Agreement"
Exhibit B	"Payment Schedule"
Exhibit C	"Technical and Implementation Documents"
C-1	"System Description" dated September 19, 2016
C-2	"Equipment List" dated September 19, 2016
C-3	"Statement of Work" dated September 19, 2016
C-4	"Acceptance Test Plan" or "ATP" dated September 19, 2016
C-5	"Performance Schedule" dated September 19, 2016
Exhibit D	Service Statement(s) of Work and "Service Terms and Conditions" (if applicable)
Exhibit E	"System Acceptance Certificate"
Exhibit F	Terms and Conditions for Service 963-5367 Rev. 5/05 as amended herein
Exhibit G	Insurance Requirements as Amended

Section 2 DEFINITIONS

Capitalized terms used in this Agreement have the following meanings:

- 2.1. "Acceptance Tests" means those tests described in the Acceptance Test Plan.
- 2.2. "Administrative User Credentials" means an account that has total access over the operating system, files, end user accounts and passwords at either the System level or box level. Customer's personnel with access to the Administrative User Credentials may be referred to as the Administrative User.
- 2.3. "Beneficial Use" means when Customer first uses the System or a Subsystem for operational purposes (excluding training or testing).
- 2.4. "Confidential Information" means any information that is disclosed in written, graphic, verbal, or machine-recognizable form, and is marked, designated, or identified at the time of disclosure as being confidential or its equivalent; or if the information is in verbal form, it is identified as confidential at the time of disclosure and is confirmed in writing within thirty (30) days of the disclosure. Confidential Information does not include any information that: is or becomes publicly known through no wrongful act of the receiving Party; is already known to the receiving Party without restriction when it is disclosed; is or becomes, rightfully and without breach of this Agreement, in the receiving Party's possession without any obligation restricting disclosure; is independently developed by the receiving Party without breach of this Agreement; or is explicitly approved for release by written authorization of the disclosing Party.
- 2.5. "Contract Price" means the price for the System, excluding applicable sales or similar taxes and freight charges.
- 2.6. "Effective Date" shall mean
- 2.7. "Equipment" means the equipment that Customer purchases from Motorola under this Agreement. Equipment that is part of the System is described in the Equipment List.

- 2.8. "Force Majeure" means an event, circumstance, or act of a third party that is beyond a Party's reasonable control (e.g., an act of God, an act of the public enemy, an act of a government entity, strikes or other labor disturbances, hurricanes, earthquakes, fires, floods, epidemics, embargoes, war, and riots).
- 2.9. "Infringement Claim" means a third party claim alleging that the Equipment manufactured by Motorola or the Motorola Software directly infringes a patent, copyright or other proprietary right enforceable in the United States.
- 2.10. "Motorola Software" means Software that Motorola or its affiliated company owns.
- 2.11. "Non-Motorola Software" means Software that another party owns.
- 2.12. "Open Source Software" (also called "freeware" or "shareware") means software that has its underlying source code freely available to evaluate, copy, and modify.
- 2.13. "Proprietary Rights" means the patents, patent applications, inventions, copyrights, trade secrets, trademarks, trade names, mask works, know-how, and other intellectual property rights in and to the Equipment and Software, including those created or produced by Motorola under this Agreement and any corrections, bug fixes, enhancements, updates or modifications to or derivative works from the Software whether made by Motorola or another party.
- 2.14. "Software" means the Motorola Software and Non-Motorola Software, in object code format that is furnished with the System or Equipment.
- 2.15. "Specifications" means the functionality and performance requirements that are described in the Technical and Implementation Documents.
- 2.16. "Subsystem" means a major part of the System that performs specific functions or operations. Subsystems are described in the Technical and Implementation Documents.
- 2.17. "System" means the Equipment, Software, and incidental hardware and materials that are combined together into an integrated system; the System is described in the Technical and Implementation Documents.
- 2.18. "System Acceptance" means the Acceptance Tests have been successfully completed.
- 2.19. "Warranty Period" means one (1) year from the date of System Acceptance or Beneficial Use, whichever occurs first.

Section 3 SCOPE OF AGREEMENT AND TERM

- 3.1. SCOPE OF WORK. Motorola will provide, install and test the System, and perform its other contractual responsibilities, all in accordance with this Agreement. Customer will perform its contractual responsibilities in accordance with this Agreement.
- 3.2. CHANGE ORDERS. Either Party may request changes within the general scope of this Agreement. If a requested change causes an increase or decrease in the cost or time required to perform this Agreement, the Parties will agree to an equitable adjustment of the Contract Price, Performance Schedule, or both, and will reflect the adjustment in a change order. Neither Party is obligated to perform requested changes unless both Parties execute a written change order.
- 3.3. TERM. Unless terminated in accordance with other provisions of this Agreement or extended by mutual agreement of the Parties, the term of this Agreement begins on the Effective Date and continues until the date of Final Project Acceptance or expiration of the Warranty Period, whichever occurs last.
- 3.4. ADDITIONAL EQUIPMENT OR SOFTWARE. For three (3) years after the Effective Date, Customer may order additional Equipment or Software if it is then available. Each order must refer to this Agreement and

must specify the pricing and delivery terms. Notwithstanding any additional or contrary terms in the order, the applicable provisions of this Agreement (except for pricing, delivery, passage of title and risk of loss to Equipment, warranty commencement, and payment terms) will govern the purchase and sale of the additional Equipment or Software. Title and risk of loss to additional Equipment will pass at shipment, warranty will commence upon delivery, and payment is due within thirty (30) days of receipt of invoice. Motorola will send Customer an invoice as the additional Equipment is shipped or Software is licensed. Alternatively, Customer may register with and place orders through Motorola Online ("MOL"), and this Agreement will be the "Underlying Agreement" for those MOL transactions rather than the MOL On-Line Terms and Conditions of Sale. MOL registration and other information may be found at <http://www.motorola.com/businessandgovernment/> and the MOL telephone number is (800) 814-0601.

3.5. **MAINTENANCE SERVICE.** During the Warranty Period, in addition to warranty services, Motorola will provide maintenance services for the Equipment and support for the Motorola Software pursuant to the Statement of Work set forth in Exhibit D. Those services and support are included in the Contract Price. If Customer wishes to purchase additional maintenance and support services for the Equipment during the Warranty Period, or any maintenance and support services for the Equipment either during the Warranty Period or after the Warranty Period, the description of and pricing for the services will be set forth in a separate document. If Customer wishes to purchase extended support for the Motorola Software after the Warranty Period, it may do so by ordering software subscription services. Unless otherwise agreed by the parties in writing, the terms and conditions applicable to those maintenance, support or software subscription services will be as may be agreed, together with the appropriate statements of work.

3.6. **SOFTWARE.** Except as otherwise stated in any Purchase Order, any Software, including subsequent releases, is licensed to Customer solely in accordance with the Software License Agreement. Customer and Motorola hereby accept and agree to abide by all of the terms and restrictions of the Software License Agreement.

3.7. **OPEN SOURCE SOFTWARE.** All Open Source Software is licensed to Customer in accordance with, and Customer agrees to abide by, the provisions of the standard license of the copyright owner and not the Software License Agreement. Upon request by Customer, Motorola will determine whether any Open Source Software or Non-Motorola Software will be provided under this Agreement; and if so, identify the Open Source Software or Non-Motorola Software and provide to Customer a copy of the applicable standard license (or specify where that license may be found); and provide to Customer a copy of the Open Source Software source code if it is publicly available without charge (although a distribution fee or a charge for related services may be applicable).

3.8. **SUBSTITUTIONS.** At no additional cost to Customer, Motorola may substitute with Customer's advance written, reasonable approval of any Equipment, Software, or services to be provided by Motorola, if the substitute meets or exceeds the Specifications and is of equivalent or better quality to the Customer. Any substitution will be reflected in a change order.

Section 4 PERFORMANCE SCHEDULE

The Parties will perform their respective responsibilities in accordance with the Performance Schedule. By executing this Agreement, Customer authorizes Motorola to proceed with contract performance.

Section 5 CONTRACT PRICE, PAYMENT AND INVOICING

5.1. **CONTRACT PRICE.** The Contract Price in U.S. dollars is **\$ 7,760,417.80**. If applicable, a pricing summary is included with the Payment Schedule. Motorola has priced the services, Software, and Equipment as an integrated system. A reduction in Software or Equipment quantities, or services, may affect the overall Contract Price, including discounts if applicable.

5.2. **INVOICING.** Except for a payment that is due on the Effective Date, Customer will make payments to Motorola within thirty (30) days after the receipt of each invoice. Invoices for system purchases will be mutually agreed to in a CSA. Customer will make payments when due in the form of a wire transfer, check, or cashier's

check from a U.S. financial institution. Overdue invoices will bear simple interest at the maximum allowable rate. For reference, the Federal Tax Identification Number for Motorola, Inc. is 36-1115800.

5.3. FREIGHT, TITLE, AND RISK OF LOSS. Motorola will pre-pay and add all freight charges to the invoices. Title to the Equipment will pass to Customer upon shipment. Title to Software will not pass to Customer at any time. Risk of loss will pass to Customer upon delivery of the Equipment to the Customer. Motorola will pack and ship all Equipment in accordance with good commercial practices.

5.4. INVOICING AND SHIPPING ADDRESSES. Invoices will be sent to the Customer at the following address:

The address which is the ultimate destination where the Equipment will be delivered to Customer is:

The Equipment will be shipped to the Customer at the following address (insert if this information is known):

Customer may change this information by giving written notice to Motorola.

Section 6 SITES AND SITE CONDITIONS

6.1. ACCESS TO SITES. In addition to its responsibilities described elsewhere in this Agreement, Customer will provide a designated project manager; all necessary construction and building permits, zoning variances, licenses, and any other approvals that are necessary to develop or use the sites and mounting locations; and access to the work sites or vehicles identified in the Technical and Implementation Documents as reasonably requested by Motorola so that it may perform its duties in accordance with the Performance Schedule and Statement of Work. If the Statement of Work so indicates, Motorola may assist Customer in the local building permit process.

6.2. SITE CONDITIONS. Customer will ensure that all work sites it provides will be safe, secure, and in compliance with all applicable industry and OSHA standards. To the extent applicable and unless the Statement of Work states to the contrary, Customer will ensure that these work sites have adequate: physical space; air conditioning and other environmental conditions; adequate and appropriate electrical power outlets, distribution, equipment and connections; and adequate telephone or other communication lines (including modem access and adequate interfacing networking capabilities), all for the installation, use and maintenance of the System. Before installing the Equipment or Software at a work site, Motorola will inspect the work site and advise Customer of any apparent deficiencies or non-conformities with the requirements of this Section. This Agreement is predicated upon normal soil conditions as defined by the version of E.I.A. standard RS-222 in effect on the Effective Date.

6.3. SITE ISSUES. If a Party determines that the sites identified in the Technical and Implementation Documents are no longer available or desired, or if subsurface, structural, adverse environmental or latent conditions at any site differ from those indicated in the Technical and Implementation Documents, the Parties will promptly investigate the conditions and will select replacement sites or adjust the installation plans and specifications as necessary. If change in sites or adjustment to the installation plans and specifications causes a change in the cost or time to perform, the Parties will equitably amend the Contract Price, Performance Schedule, or both, by a change order.

Section 7 TRAINING

Any training to be provided by Motorola to Customer will be described in the Statement of Work. Customer will notify Motorola immediately if a date change for a scheduled training program is required. If Motorola will incur additional out of pocket costs because Customer reschedules a training program less than thirty (30) days

before its scheduled start date, Motorola will inform Customer of such additional out of pocket costs and if Customer still wants to reschedule, Customer will reimburse Motorola for these additional costs.

Section 8 SYSTEM ACCEPTANCE

8.1. COMMENCEMENT OF ACCEPTANCE TESTING. Motorola will provide to Customer at least ten (10) days notice before the Acceptance Tests commence. System testing will occur only in accordance with the Acceptance Test Plan.

8.2. SYSTEM ACCEPTANCE. System Acceptance will occur upon successful completion of the Acceptance Tests. Upon System Acceptance, the Parties will memorialize this event by promptly executing a System Acceptance Certificate. If the Acceptance Test Plan includes separate tests for individual Subsystems or phases of the System, acceptance of the individual Subsystem or phase will occur upon the successful completion of the Acceptance Tests for the Subsystem or phase, and the Parties will promptly execute an acceptance certificate for the Subsystem or phase. If Customer believes the System has failed the completed Acceptance Tests, Customer will provide to Motorola a written notice that includes the specific details of the failure. If Customer does not provide to Motorola a failure notice within thirty (30) days after completion of the Acceptance Tests, System Acceptance will be deemed to have occurred as of the completion of the Acceptance Tests. Minor omissions or variances in the System that do not materially impair the operation of the System as a whole (e.g., incomplete documentation, minor damage to equipment that does not affect its operation, spare equipment inventories not fully accounted for) will not postpone System Acceptance or Subsystem acceptance, but will be corrected according to a mutually agreed schedule.

8.3. BENEFICIAL USE. Customer acknowledges that Motorola's ability to perform its implementation and testing responsibilities may be impeded if Customer begins using the System before System Acceptance. Therefore, Customer will not commence Beneficial Use before System Acceptance without Motorola's prior written authorization, which will not be unreasonably withheld. Motorola is not responsible for System performance deficiencies that occur during unauthorized Beneficial Use. Upon commencement of Beneficial Use, Customer assumes responsibility for the use and operation of the System.

8.4 FINAL PROJECT ACCEPTANCE. Final Project Acceptance will occur after System Acceptance when all deliverables and other work have been completed. When Final Project Acceptance occurs, the parties will promptly memorialize this final event by so indicating on the System Acceptance Certificate.

Section 9 REPRESENTATIONS AND WARRANTIES

9.1. SYSTEM FUNCTIONALITY. Motorola represents that the System will perform in accordance with the Specifications in all material respects. Upon System Acceptance or Beneficial Use, whichever occurs first, this System functionality representation is fulfilled. Motorola is not responsible for System performance deficiencies that are caused by ancillary equipment not furnished by Motorola which is attached to or used in connection with the System or for reasons or parties beyond Motorola's control, such as natural causes; the construction of a building that adversely affects the microwave path reliability or radio frequency (RF) coverage; the addition of frequencies at System sites that cause RF interference or intermodulation; or Customer changes to load usage or configuration outside the Specifications.

9.2. EQUIPMENT WARRANTY. During the Warranty Period, Motorola warrants that the Equipment under normal use and service will be free from material defects in materials and workmanship. If System Acceptance is delayed beyond six (6) months after shipment of the Equipment by events or causes within Customer's control, this warranty expires eighteen (18) months after the shipment of the Equipment.

9.3. MOTOROLA SOFTWARE WARRANTY. Unless otherwise stated in the Software License Agreement, during the Warranty Period, Motorola warrants the Motorola Software in accordance with the terms of the Software License Agreement and the provisions of this Section 9 that are applicable to the Motorola Software. If System Acceptance is delayed beyond six (6) months after shipment of the Motorola Software by events or causes within Customer's control, this warranty expires eighteen (18) months after the shipment of the Motorola Software. TO THE EXTENT, IF ANY, THAT THERE IS A SEPARATE LICENSE AGREEMENT PACKAGED WITH, OR PROVIDED ELECTRONICALLY WITH, A PARTICULAR PRODUCT THAT BECOMES EFFECTIVE

ON AN ACT OF ACCEPTANCE BY THE END USER, THEN THAT AGREEMENT SHALL NOT SUPERCEDE THIS SOFTWARE LICENSE AGREEMENT AS TO THE END USER OF EACH SUCH PRODUCT EXCEPT FOR PRODUCTS RELATING TO OPEN SOURCE SOFTWARE, CANOPY, WIRELESS WIBB OR AS REQUIRED BY THIRD PARTY HARDWARE PRODUCTS.

9.4. EXCLUSIONS TO EQUIPMENT AND MOTOROLA SOFTWARE WARRANTIES. These warranties do not apply to: (i) defects or damage resulting from: use of the Equipment or Motorola Software in other than its normal, customary, and authorized manner; accident, liquids, neglect, or acts of God; testing, maintenance, disassembly, repair, installation, alteration, modification, or adjustment not provided or authorized in writing by Motorola; Customer's failure to comply with all applicable industry and OSHA standards; (ii) breakage of or damage to antennas unless caused directly by defects in material or workmanship; (iii) Equipment that has had the serial number removed or made illegible; (iv) batteries (because they carry their own separate limited warranty) or consumables; (v) freight costs to ship Equipment to the repair depot; (vi) scratches or other cosmetic damage to Equipment surfaces that does not affect the operation of the Equipment; and (vii) normal or customary wear and tear.

9.5. WARRANTY CLAIMS. To assert a warranty claim, Customer must notify Motorola in writing of the claim it had incurred before the expiration of the Warranty Period. Upon receipt of this notice, Motorola will investigate the warranty claim. Motorola will (at its option and at no additional charge to Customer) repair the defective Equipment or Motorola Software, replace it with the same or equivalent product, or, as long as the defective Equipment or Software is not critical to the operation of the system, refund the price of the defective Equipment or Motorola Software. That action will be the full extent of Motorola's liability for the warranty claim. If the warranty claim is not valid, then Motorola may invoice Customer for responding to the claim on a time and materials basis using Motorola's then current labor rates. Repaired or replaced product is warranted for the balance of the original applicable warranty period. All replaced products or parts will become the property of Motorola.

9.6. ORIGINAL END USER IS COVERED. These express limited warranties are extended by Motorola to the original user purchasing the System for commercial, industrial, or governmental use only, and are not assignable or transferable.

9.7. DISCLAIMER OF OTHER WARRANTIES. THESE WARRANTIES ARE THE COMPLETE WARRANTIES FOR THE EQUIPMENT AND MOTOROLA SOFTWARE PROVIDED UNDER THIS AGREEMENT AND ARE GIVEN IN LIEU OF ALL OTHER WARRANTIES. MOTOROLA DISCLAIMS ALL OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Section 10 DELAYS

10.1. FORCE MAJEURE. Neither Party will be liable for its non-performance or delayed performance if caused by a Force Majeure. A Party that becomes aware of a Force Majeure that will significantly delay performance will notify the other Party promptly (but in no event later than fifteen days) after it discovers the Force Majeure. If a Force Majeure occurs, the Parties will execute a change order to extend the Performance Schedule for a time period that is reasonable under the circumstances.

10.2. PERFORMANCE SCHEDULE DELAYS CAUSED BY CUSTOMER. If Customer (including its other contractors) delays the Performance Schedule, it will make the promised payments according to the Payment Schedule as if no delay occurred; and the Parties will execute a change order to extend the Performance Schedule and, if requested, compensate Motorola for all reasonable charges incurred because of the delay. Delay charges may include costs incurred by Motorola or its subcontractors for additional freight, warehousing and handling of Equipment; extension of the warranties; travel; suspending and re-mobilizing the work; additional engineering, project management, and standby time calculated at then current rates; and preparing and implementing an alternative implementation plan.

Section 11 DISPUTES

The Parties will use the following procedure to address any dispute arising under this Agreement (a "Dispute").

11.1. GOVERNING LAW. This Agreement will be governed by and construed in accordance with the laws of the State in which the System is installed.

11.2. NEGOTIATION. Either Party may initiate the Dispute resolution procedures by sending a notice of Dispute ("Notice of Dispute"). The Parties will attempt to resolve the Dispute promptly through good faith negotiations including 1) timely escalation of the Dispute to executives who have authority to settle the Dispute and who are at a higher level of management than the persons with direct responsibility for the matter and 2) direct communication between the executives.

11.3 RESERVED.

11.4. LITIGATION, VENUE and JURISDICTION. If a Dispute remains unresolved for sixty (60) days after receipt of the Notice of Dispute, either Party may then submit the Dispute to a court of competent jurisdiction in the state in which the System is installed. Each Party irrevocably agrees to submit to the exclusive jurisdiction of the courts in such state over any claim or matter arising under or in connection with this Agreement.

11.5. CONFIDENTIALITY. All communications pursuant to subsection 11.2 will be treated as compromise and settlement negotiations for purposes of applicable rules of evidence and any additional confidentiality protections provided by applicable law. The use of these Dispute resolution procedures will not be construed under the doctrines of laches, waiver or estoppel to affect adversely the rights of either Party.

Section 12 DEFAULT AND TERMINATION

12.1 DEFAULT BY A PARTY. If either Party fails to perform a material obligation under this Agreement, the other Party may consider the non-performing Party to be in default (unless a Force Majeure causes the failure) and may assert a default claim by giving the non-performing Party a written and detailed notice of default. The defaulting Party will have thirty (30) days after receipt of the notice of default to either cure the default or, if the default is not curable within thirty (30) days, provide a written cure plan that is acceptable to the non-defaulting Party. The defaulting Party will begin implementing the cure plan immediately after receipt of notice by the other Party that it approves the plan. If Customer is the defaulting Party, Motorola may stop work on the project until it approves the Customer's cure plan.

12.2. FAILURE TO CURE. If a defaulting Party fails to cure the default as provided above in Section 12.1, unless otherwise agreed in writing, the non-defaulting Party may terminate any unfulfilled portion of this Agreement. In the event of termination for default, the defaulting Party will promptly return to the non-defaulting Party any of its Confidential Information. If Customer is the non-defaulting Party, terminates this Agreement as permitted by this Section, and completes the System through a third Party, Customer may as its exclusive remedy recover from Motorola reasonable costs incurred to complete the System without any increasing capability less the unpaid portion of the Contract Price. Customer will mitigate damages and provide Motorola with detailed invoices substantiating the charges.

Section 13 INDEMNIFICATION

13.1. If Customer gives Motorola prompt, written notice of the claim or suit Motorola shall defend, indemnify and hold Customer, and all of its officers, agents and employees harmless for any claim, loss, damage, cost, charge, expense, lien, settlement or judgment, including interest thereon, whether to any person, including employees of Motorola, its Subcontractors and Suppliers, or property or both, to the extent it is caused by the negligence of Motorola's or any of its Subcontractor's or Supplier's performance of the Agreement to which Customer or any of its officers, agents or employees may be subject or put. Without limiting the foregoing, said obligation includes claims involving Motorola's, Supplier's or Subcontractor's employees injured while going to and from the Project. Motorola shall not be liable under this section for damage to persons or property to the extent it is caused or resulting from the negligence of Customer, or any of its officers, agents or employees.

13.2. Customer will cooperate with Motorola in its defense or settlement of the claim or suit. In the event any suit or other proceedings for any claim, loss, damage, cost, charge or expense covered by Motorola's foregoing indemnity should be brought against Customer or any of its officers, agents or employees, Motorola defend the

same at Motorola's own expense and to pay any and all costs, charges, attorney's fees, and other expenses, and any and all judgments that may be incurred by or obtained against Customer or any of its officers, agents, or employees in such suits or other proceedings. In the event of any judgment or other lien being placed upon the property of Customer in such suits or other proceedings, Motorola shall cause the same to be dissolved and discharged by giving bond or otherwise. This section sets forth the full extent of Motorola's general indemnification of Customer from liabilities that are in any way related to Motorola's performance under this Agreement. This does not affect the obligations under section 13.3 below.

13.3. PATENT AND COPYRIGHT INFRINGEMENT.

13.3.1. Motorola will defend at its expense any suit brought against Customer to the extent it is based on a third-party claim alleging that the Equipment manufactured by Motorola or the Motorola Software ("Motorola Product") directly infringes a patent, copyright or other proprietary right enforceable in the United States ("Infringement Claim"). Motorola's duties to defend and indemnify are conditioned upon: Customer promptly notifying Motorola in writing of the Infringement Claim; Motorola having sole control of the defense of the suit and all negotiations for its settlement or compromise; and Customer providing to Motorola cooperation and, if requested by Motorola, reasonable assistance in the defense of the Infringement Claim at Motorola's expense. In addition to Motorola's obligation to defend, and subject to the same conditions, Motorola will pay all damages finally awarded against Customer by a court of competent jurisdiction for an Infringement Claim or agreed to, in writing, by Motorola in settlement of an Infringement Claim.

13.3.2. If an Infringement Claim occurs, or in Motorola's opinion is likely to occur, Motorola may at its option and expense: (a) procure for Customer the right to continue using the Motorola Product; (b) replace or modify the Motorola Product so that it becomes non-infringing while providing functionally equivalent performance; or (c) accept the return of the Motorola Product and grant Customer a credit for the Motorola Product, less a reasonable charge for depreciation. The depreciation amount will be calculated based upon generally accepted accounting standards.

13.3.3. Motorola will have no duty to defend or indemnify for any Infringement Claim that is based upon: (a) the combination of the Motorola Product with any software, apparatus or device not furnished by Motorola; (b) the use of ancillary equipment or software not furnished by Motorola and that is attached to or used in connection with the Motorola Product; (c) a modification of the Motorola Product by a party other than Motorola; (f) use of the Motorola Product in a manner for which the Motorola Product was not designed as described in the documentation or that is inconsistent with the terms of this Agreement; or (f) the failure by Customer to install an enhancement release to the Motorola Software that is intended to correct the claimed infringement.

13.3.4. This Section 13 provides Customer's sole and exclusive remedies and Motorola's entire liability in the event of an Infringement Claim. Customer has no right to recover and Motorola has no obligation to provide any other or further remedies, whether under another provision of this Agreement or any other legal theory or principle, in connection with an Infringement Claim. .

Section 14 LIMITATION OF LIABILITY

Except for personal injury, death or obligations under Section 13, Motorola's total liability, whether for breach of contract, warranty, negligence, strict liability in tort, indemnification, or otherwise, will be limited to the direct damages recoverable under law, but not to exceed the price of the Equipment, Software, or services with respect to which losses or damages are claimed. ALTHOUGH THE PARTIES ACKNOWLEDGE THE POSSIBILITY OF SUCH LOSSES OR DAMAGES, THEY AGREE THAT NEITHER PARTY WILL BE LIABLE FOR ANY COMMERCIAL LOSS; INCONVENIENCE; LOSS OF USE, TIME, DATA, GOOD WILL, REVENUES, PROFITS OR SAVINGS; OR OTHER SPECIAL, INCIDENTAL, INDIRECT, OR CONSEQUENTIAL DAMAGES IN ANY WAY RELATED TO OR ARISING FROM THIS AGREEMENT, THE SALE OR USE OF THE EQUIPMENT OR SOFTWARE, OR THE PERFORMANCE OF SERVICES BY EITHER PARTY PURSUANT TO THIS AGREEMENT. This limitation of liability provision survives the expiration or termination of the Agreement and applies notwithstanding any contrary provision. No action for contract breach or otherwise relating to the transactions contemplated by this Agreement may be brought more than three (3) years after the accrual of the cause of action.

Section 15 CONFIDENTIALITY AND PROPRIETARY RIGHTS

15.1. **CONFIDENTIAL INFORMATION.** During the term of this Agreement, the parties may provide each other with Confidential Information. Each Party will: maintain the confidentiality of the other Party's Confidential Information and not disclose it to any third party other than contractors as referenced below, except as authorized by the disclosing Party in writing or as required by a court of competent jurisdiction; restrict disclosure of the Confidential Information to its employees or contractors who have a "need to know" and not copy or reproduce the Confidential Information; take necessary and appropriate precautions to guard the confidentiality of the Confidential Information, including informing its employees or contractors who handle the Confidential Information that it is confidential and is not to be disclosed to others, but these precautions will be at least the same degree of care that the receiving Party applies to its own confidential information and will not be less than reasonable care; and use the Confidential Information only in furtherance of the performance of this Agreement. Confidential Information is and will at all times remain the property of the disclosing Party, and no grant of any proprietary rights in the Confidential Information is given or intended, including any express or implied license, other than the limited right of the recipient to use the Confidential Information in the manner and to the extent permitted by this Agreement. Customer may disclose Confidential Information to contractors that have executed a Non-Disclosure Agreement.

15.2. **PRESERVATION OF MOTOROLA'S PROPRIETARY RIGHTS.** Motorola, the third party manufacturer of any Equipment, and the copyright owner of any Non-Motorola Software own and retain all of their respective Proprietary Rights in the Equipment and Software, and nothing in this Agreement is intended to restrict their Proprietary Rights. All intellectual property developed, originated, or prepared by Motorola in connection with providing to Customer the Equipment, Software, or related services remain vested exclusively in Motorola, and this Agreement does not grant to Customer any shared development rights of intellectual property. Except as explicitly provided in the Software License Agreement, Motorola does not grant to Customer, either directly or by implication, estoppel, or otherwise, any right, title or interest in Motorola's Proprietary Rights. Customer will not modify, disassemble, peel components, decompile, otherwise reverse engineer or attempt to reverse engineer, derive source code or create derivative works from, adapt, translate, merge with other software, reproduce, distribute, sublicense, sell or export the Software, or permit or encourage any third party to do so. The preceding sentence does not apply to Open Source Software which is governed by the standard license of the copyright owner.

Section 16 GENERAL

16.1. **TAXES.** The Contract Price does not include any sales, use, taxes, all of which will be paid by Customer except as exempt by law. If Motorola is required to pay any of these taxes, Motorola will send an invoice to Customer and Customer will pay to Motorola the amount of the taxes (including any interest and penalties) within thirty (30) days after the receipt of the invoice. Customer will be solely responsible for reporting the Equipment owned by it for personal property tax purposes, and Motorola will be solely responsible for reporting taxes on its income or net worth.

16.2. **ASSIGNABILITY AND SUBCONTRACTING.** Except as provided herein, neither Party may assign this Agreement or any of its rights or obligations hereunder without the prior written consent of the other Party, which consent will not be unreasonably withheld. Any attempted assignment, delegation, or transfer without the necessary consent will be void. Notwithstanding the foregoing, Motorola may assign this Agreement to any of its affiliates or its right to receive payment without the prior consent of Customer. In addition, in the event either party separates one or more of its businesses (each a "Separated Business"), whether by way of a sale, establishment of a joint venture, spin-off or otherwise (each a "Separation Event"), either party may, without the prior written consent, but with notice of the other Party and at no additional cost, assign this Agreement such that it will continue to benefit the Separated Business and its affiliates following the Separation Event. Motorola may subcontract any of the work, but subcontracting will not relieve Motorola of its duties under this Agreement.

16.3 **WAIVER.** Failure or delay by either Party to exercise a right or power under this Agreement will not be a waiver of the right or power. For a waiver of a right or power to be effective, it must be in a writing signed by the waiving Party. An effective waiver of a right or power will not be construed as either a future or continuing waiver of that same right or power, or the waiver of any other right or power.

16.4. SEVERABILITY. If a court of competent jurisdiction renders any part of this Agreement invalid or unenforceable, that part will be severed and the remainder of this Agreement will continue in full force and effect.

16.5. INDEPENDENT CONTRACTORS. Each Party will perform its duties under this Agreement as an independent contractor. The Parties and their personnel will not be considered to be employees or agents of the other Party. Nothing in this Agreement will be interpreted as granting either Party the right or authority to make commitments of any kind for the other. This Agreement will not constitute, create, or be interpreted as a joint venture, partnership or formal business organization of any kind.

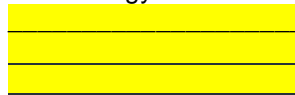
16.6. HEADINGS AND SECTION REFERENCES. The section headings in this Agreement are inserted only for convenience and are not to be construed as part of this Agreement or as a limitation of the scope of the particular section to which the heading refers. This Agreement will be fairly interpreted in accordance with its terms and conditions and not for or against either Party.

16.7. ENTIRE AGREEMENT. This Agreement, including all Exhibits, constitutes the entire agreement of the Parties regarding the subject matter of the Agreement and supersedes all previous agreements, proposals, and understandings, whether written or oral, relating to this subject matter. This Agreement may be amended or modified only by a written instrument signed by authorized representatives of both Parties. The preprinted terms and conditions found on any Customer or Motorola purchase order, acknowledgment or other form will not be considered an amendment or modification of this Agreement, even if a representative of each Party signs that document.

16.8. NOTICES. Notices required under this Agreement to be given by one Party to the other must be in writing and either personally delivered or sent to the address shown below by certified mail, return receipt requested and postage prepaid (or by a recognized courier service, such as Federal Express, UPS, or DHL), or by facsimile with correct answerback received, and will be effective upon receipt:

Motorola Solutions, Inc.
Attn: Marty Rogan
500 W Monroe Street, 43rd floor,
Chicago, IL 60661-3634

DTE Energy



16.9. COMPLIANCE WITH APPLICABLE LAWS. Each Party will comply with all applicable federal, state, and local laws, regulations and rules concerning the performance of this Agreement or use of the System. Customer will obtain and comply with all Federal Communications Commission ("FCC") licenses and authorizations required for the installation, operation and use of the System before the scheduled installation of the Equipment. Although Motorola might assist Customer in the preparation of its FCC license applications, neither Motorola nor any of its employees is an agent or representative of Customer in FCC or other matters.

16.10. AUTHORITY TO EXECUTE AGREEMENT. Each Party represents that it has obtained all necessary approvals, consents and authorizations to enter into this Agreement and to perform its duties under this Agreement; the person executing this Agreement on its behalf has the authority to do so; upon execution and delivery of this Agreement by the Parties, it is a valid and binding contract, enforceable in accordance with its terms; and the execution, delivery, and performance of this Agreement does not violate any bylaw, charter, regulation, law or any other governing authority of the Party.

16.11. ADMINISTRATOR LEVEL ACCOUNT ACCESS. Motorola will provide Customer with Administrative User Credentials. Customer agrees to only grant Administrative User Credentials to those personnel with the training or experience to correctly use the access. Customer is responsible for protecting Administrative User Credentials from disclosure and maintaining Credential validity by, among other things, updating passwords when required. Customer may be asked to provide valid Administrative User Credentials when in contact with Motorola System support. Customer understands that changes made as the Administrative User can significantly impact the performance of the System. Customer agrees that it will be solely responsible for any negative impact on the System or its users by any such changes. System issues occurring as a result of changes made by an Administrative User may impact Motorola's ability to perform its obligations under the Agreement or its Maintenance and Support Agreement. In such cases, a revision to the appropriate provisions of the Agreement, including the Statement of Work, may be necessary. To the extent Motorola provides assistance

to correct any issues caused by or arising out of the use of or failure to maintain Administrative User Credentials, Motorola will be entitled to bill Customer and Customer will pay Motorola on a time and materials basis for resolving the issue.

16.12. SURVIVAL OF TERMS. The following provisions will survive the expiration or termination of this Agreement for any reason: Section 3.6 (Motorola Software); Section 3.7 (Non-Motorola Software); if any payment obligations exist, Sections 5.1 and 5.2 (Contract Price and Invoicing and Payment); Subsection 9.7 (Disclaimer of Implied Warranties); Section 11 (Disputes); Section 14 (Limitation of Liability); and Section 15 (Confidentiality and Proprietary Rights); and all of the General provisions in Section 16.

The Parties hereby enter into this Agreement as of the Effective Date.

Motorola Solutions, Inc.

Customer: DTE Energy

By: _____
Name: _____
Title: _____
Date: _____

By: _____
Name: _____
Title: _____
Date: _____

Exhibit A

SOFTWARE LICENSE AGREEMENT

This Exhibit A Software License Agreement ("Agreement") is between Motorola Solutions, Inc., ("Motorola"), and The Detroit Edison Company ("Licensee").

For good and valuable consideration, the parties agree as follows:

Section 1 DEFINITIONS

1.1 "Affiliate" means any entity that Controls, is Controlled By or is Under Common Control With Licensee.

1.1.1 "Controls", "Controlled By" and "Under Common Control With" means that a legal entity owns more than fifty percent (50%) of whose outstanding shares or securities representing the right to vote for the election of directors or other managing authority are, or more than fifty percent (50%) of whose equity interest is, now or hereafter, owned or controlled, or under common control with directly or indirectly by that party (but only so long as such ownership or control or equity interest exists).

1.2 "Designated Products" means products provided by Motorola to Licensee with which or for which the Software and Documentation is licensed for use.

1.3 "Documentation" means product and software documentation that specifies technical and performance features and capabilities, and the user, operation and training manuals for the Software (including all physical or electronic media upon which such information is provided).

1.4 "Open Source Software" means software with either freely obtainable source code, license for modification, or permission for free distribution.

1.5 "Open Source Software License" means the terms or conditions under which the Open Source Software is licensed.

1.6 "Primary Agreement" means the agreement to which this exhibit is attached.

1.7 "Security Vulnerability" means a flaw or weakness in system security procedures, design, implementation, or internal controls that could be exercised (accidentally triggered or intentionally exploited) and result in a security breach such that data is compromised, manipulated or stolen or the system damaged.

1.8 "Software" (i) means proprietary software in object code format, and adaptations, translations, de-compilations, disassemblies, emulations, or derivative works of such software; (ii) means any modifications, enhancements, new versions and new releases of the software provided by Motorola; and (iii) may contain one or more items of software owned by a third party supplier. The term "Software" does not include any third party software provided under separate license or third party software not licensable under the terms of this Agreement or Open Source Software which the parties agree is required to be governed under the terms of the corresponding Open Source Software License.

Section 2 SCOPE

Motorola and Licensee enter into this Agreement in connection with Motorola's delivery of certain proprietary Software or products containing embedded or pre-loaded proprietary Software, or both. This Agreement contains the terms and conditions of the license Motorola is providing to Licensee, and Licensee's use of the Software and Documentation.

Section 3 GRANT OF LICENSE

3.1. Subject to the provisions of this Agreement and the payment of applicable license fees, Motorola grants to Licensee and its Affiliates a perpetual (subject to section 8 below), personal, limited, non-transferable (except as permitted in Section 7) and non-exclusive license under Motorola's copyrights and Confidential Information (as defined in the Primary Agreement) embodied in the Software to use the Software, in object code form, and the Documentation solely in connection with Licensee's use of the Designated Products. This Agreement does not grant any rights to source code.

3.2. If the Software licensed under this Agreement contains or is derived from Open Source Software, the terms and conditions governing the use of such Open Source Software are in the Open Source Software Licenses of the copyright owner and not this Agreement. If there is a conflict between the terms and conditions of this Agreement and the terms and conditions of the Open Source Software Licenses governing Licensee's use of the Open Source Software, the terms and conditions of the license grant of the applicable Open Source Software Licenses will take precedence over the license grants in this Agreement. If requested by Licensee Motorola will: (i) determine whether any Open Source Software is provided under this Agreement; (ii) identify the Open Source Software and provide Licensee a copy of the applicable Open Source Software License (or specify where that license may be found); and, (iii) provide Licensee a copy of the Open Source Software source code, without charge (although distribution fees may be applicable).

Section 4 LIMITATIONS ON USE

4.1. Licensee and its Affiliates may use the Software only for Licensee's internal business purposes and only in accordance with the Documentation. Any other use of the Software is strictly prohibited. Without limiting the general nature of these restrictions, Licensee will not make the Software available for use by third parties on a "time sharing," "application service provider," or "service bureau" basis or for any other similar commercial rental or sharing arrangement.

4.2. Licensee will not, and will not allow or enable any third party to: (i) reverse engineer, disassemble, peel components, decompile, reprogram or otherwise reduce the Software or any portion to a human perceptible form or otherwise attempt to recreate the source code; (ii) modify, adapt, create derivative works of, or merge the Software; (iii) copy, reproduce, distribute, lend, or lease the Software or Documentation to any third party, grant any sublicense or other rights in the Software or Documentation to any third party, or take any action that would cause the Software or Documentation to be placed in the public domain; (iv) remove, or in any way alter or obscure, any copyright notice or other notice of Motorola's proprietary rights; (v) provide, copy, transmit, disclose, divulge or make the Software or Documentation available to, or permit the use of the Software by any third party or on any machine except as expressly authorized by this Agreement; or (vi) use, or permit the use of, the Software in a manner that would result in the production of a copy of the Software solely by activating a machine containing the Software. Licensee may make one copy of Software to be used solely for archival, back-up, or disaster recovery purposes; *provided* that Licensee may not operate that copy of the Software at the same time as the original Software is being operated. Licensee may make as many copies of the Documentation as it may reasonably require for the internal use of the Software.

4.3. Unless otherwise authorized by Motorola in writing, Licensee will not, and will not enable or allow any third party to: (i) install a licensed copy of the Software on more than one unit of a Designated Product; or (ii) copy onto or transfer Software installed in one unit of a Designated Product onto one other device. Licensee may temporarily transfer Software installed on a Designated Product to another device if the Designated Product is inoperable or malfunctioning, if Licensee provides written notice to Motorola of the temporary transfer and identifies the device on which the Software is transferred. Temporary transfer of the Software to another device must be discontinued when the original Designated Product is returned to operation and the Software must be removed from the other device. Licensee must provide prompt written notice to Motorola at the time temporary transfer is discontinued.

4.4. When using Motorola's Radio Service Software ("RSS"), Licensee must purchase a separate license for each location at which Licensee uses RSS. Licensee's use of RSS at a licensed location does not entitle Licensee to use or access RSS remotely. Licensee may make one copy of RSS for each licensed location.

Licensee shall provide Motorola with a list of all locations at which Licensee uses or intends to use RSS upon Motorola's request.

4.5. Licensee will maintain, during the term of this Agreement and for a period of two years thereafter, accurate records relating to this license grant to verify compliance with this Agreement. Motorola or an independent third party ("Auditor") may inspect Licensee's premises, books and records, upon reasonable prior notice to Licensee, during Licensee's normal business hours and subject to Licensee's facility and security regulations. Motorola is responsible for the payment of all expenses and costs of the Auditor. Any information obtained by Motorola and the Auditor will be kept in strict confidence by Motorola and the Auditor and used solely for the purpose of verifying Licensee's compliance with the terms of this Agreement.

Section 5 OWNERSHIP AND TITLE

Motorola, its licensors, and its suppliers retain all of their proprietary rights in any form in and to the Software and Documentation, including, but not limited to, all rights in patents, patent applications, inventions, copyrights, trademarks, trade secrets, trade names, and other proprietary rights in or relating to the Software and Documentation (including any corrections, bug fixes, enhancements, updates, modifications, adaptations, translations, de-compilations, disassemblies, emulations to or derivative works from the Software or Documentation, whether made by Motorola or another party, or any improvements that result from Motorola's processes or, provision of information services). No rights are granted to Licensee under this Agreement by implication, estoppel or otherwise, except for those rights which are expressly granted to Licensee in this Agreement. All intellectual property developed, originated, or prepared by Motorola in connection with providing the Software, Designated Products, Documentation or related services, remains vested exclusively in Motorola, and Licensee will not have any shared development or other intellectual property rights.

Section 6 LIMITED WARRANTY; DISCLAIMER OF WARRANTY

6.1. The commencement date and the term of the Software warranty will be a period of ninety (90) days from Motorola's shipment of the Software (the "Warranty Period"). If Licensee is not in breach of any of its obligations under this Agreement, Motorola warrants that the unmodified Software, when used properly and in accordance with the Documentation and this Agreement, will be free from a reproducible defect that eliminates the functionality or successful operation of a feature critical to the primary functionality or successful operation (the ability of the radio system to transmit and receive communications as described in the Documentation) of the Software. Whether a defect occurs will be determined by Motorola solely with reference to the Documentation and upon Licensee's request, through the C3 Process as explained in Attachment 1. Should licensee disagree with Motorola's determination that a defect has occurred it may appeal the decision through the dispute resolution process as explained in Section 11 of the CSA. Motorola does not warrant that Licensee's use of the Software or the Designated Products will be uninterrupted, error-free, completely free of Security Vulnerabilities, or that the Software or the Designated Products will meet Licensee's particular requirements. Motorola makes no representations or warranties with respect to any third party software included in the Software.

6.2 Motorola's sole obligation to Licensee and Licensee's exclusive remedy under this warranty is to remedy any material Software defect covered by this warranty. These efforts will involve either replacing the media or attempting to correct demonstrable program or documentation errors or Security Vulnerabilities that materially affect successful operation of the Software. If Motorola cannot correct the defect within a reasonable time, then at Motorola's option, Motorola will replace the defective Software with functionally-equivalent Software, license to Licensee substitute Software which will accomplish the same objective, or if both parties agree that either of these options are not commercially viable terminate the license and refund the Licensee's paid license fee.

6.3. Warranty claims are described in the Primary Agreement.

6.4. The express warranties set forth in this Section 6 are in lieu of, and Motorola disclaims, any and all other warranties (express or implied, oral or written) with respect to the Software or Documentation, including, without limitation, any and all implied warranties of condition, title, non-infringement, merchantability, or fitness for a particular purpose or use by Licensee (whether or not Motorola knows, has reason to know, has been advised, or is otherwise aware of any such purpose or use), whether arising by law, by reason of custom or usage of

trade, or by course of dealing. In addition, Motorola disclaims any warranty to any person other than Licensee with respect to the Software or Documentation.

Section 7 TRANSFERS

Licensee will not transfer the Software or Documentation to any third party without Motorola's prior written consent. Motorola's consent may be withheld at its discretion and may be conditioned upon transferee paying all applicable license fees and agreeing to be bound by this Agreement. If the Designated Products are Motorola's radio products and Licensee transfers ownership of the Motorola radio products to a third party, Licensee may assign its right to use the Software (other than RSS and Motorola's FLASHport® software) which is embedded in or furnished for use with the radio products and the related Documentation; *provided* that Licensee transfers all copies of the Software and Documentation to the transferee, and Licensee and the transferee sign a transfer form to be provided by Motorola upon request, obligating the transferee to be bound by this Agreement.

Section 8 TERM AND TERMINATION

8.1 Licensee's right to use the Software and Documentation will begin when the Primary Agreement is signed by both parties and will continue for the life of the Designated Products with which or for which the Software and Documentation have been provided by Motorola, unless Licensee breaches this Agreement, in which case this Agreement and Licensee's right to use the Software and Documentation may be terminated upon notice and opportunity to cure within **10** days.

8.2 Within thirty (30) days after termination of this Agreement, Motorola will request and Licensee must certify in writing to Motorola that all copies of the Software have been removed or deleted from the Designated Products and that all copies of the Software and Documentation have been returned to Motorola or destroyed by Licensee and are no longer in use by Licensee.

8.3 Licensee acknowledges that Motorola made a considerable investment of resources in the development, marketing, and distribution of the Software and Documentation and that Licensee's breach of this Agreement will result in irreparable harm to Motorola for which monetary damages would be inadequate. If Licensee breaches this Agreement, which breach remains uncured, Motorola may terminate this Agreement and be entitled to all available remedies at law or in equity (including immediate injunctive relief and repossession of all non-embedded Software and associated Documentation unless Licensee is a Federal agency of the United States Government).

Section 9 UNITED STATES GOVERNMENT LICENSING PROVISIONS

This Section applies if Licensee is the United States Government or a United States Government agency. Licensee's use, duplication or disclosure of the Software and Documentation under Motorola's copyrights or trade secret rights is subject to the restrictions set forth in subparagraphs (c)(1) and (2) of the Commercial Computer Software-Restricted Rights clause at FAR 52.227-19 (JUNE 1987), if applicable, unless they are being provided to the Department of Defense. If the Software and Documentation are being provided to the Department of Defense, Licensee's use, duplication, or disclosure of the Software and Documentation is subject to the restricted rights set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.227-7013 (OCT 1988), if applicable. The Software and Documentation may or may not include a Restricted Rights notice, or other notice referring to this Agreement. The provisions of this Agreement will continue to apply, but only to the extent that they are consistent with the rights provided to the Licensee under the provisions of the FAR or DFARS mentioned above, as applicable to the particular procuring agency and procurement transaction.

Section 10 CONFIDENTIALITY

Licensee acknowledges that the Software and Documentation contain Motorola's valuable proprietary and Confidential Information and are Motorola's trade secrets, and that the provisions in the Primary Agreement concerning Confidential Information apply.

Section 11 LIMITATION OF LIABILITY

The Limitation of Liability provision is described in the Primary Agreement.

Section 12 NOTICES

Notices are described in the Primary Agreement.

Section 13 GENERAL

13.1. COPYRIGHT NOTICES. The existence of a copyright notice on the Software will not be construed as an admission or presumption of publication of the Software or public disclosure of any trade secrets associated with the Software.

13.2. COMPLIANCE WITH LAWS. Licensee acknowledges that the Software is subject to the laws and regulations of the United States and Licensee will comply with all applicable laws and regulations, including export laws and regulations of the United States. Licensee will not, without the prior authorization of Motorola and the appropriate governmental authority of the United States, in any form export or re-export, sell or resell, ship or reship, or divert, through direct or indirect means, any item or technical data or direct or indirect products sold or otherwise furnished to any person within any territory for which the United States Government or any of its agencies at the time of the action, requires an export license or other governmental approval. Violation of this provision is a material breach of this Agreement.

13.3. ASSIGNMENTS AND SUBCONTRACTING. Motorola may assign its rights or subcontract its obligations under this Agreement, or encumber or sell its rights in any Software, without prior notice to or consent of Licensee. Motorola may not subcontract work that will be performed on Licensee's property without giving reasonable prior notice to Licensee.

13.4. GOVERNING LAW. This Agreement is governed by the laws of the United States to the extent that they apply and otherwise by the internal substantive laws of the State to which the Software is shipped if Licensee is a sovereign government entity, or the internal substantive laws of the State of Michigan if Licensee is not a sovereign government entity. The terms of the U.N. Convention on Contracts for the International Sale of Goods do not apply. In the event that the Uniform Computer Information Transaction Act, any version of this Act, or a substantially similar law (collectively "UCITA") becomes applicable to a party's performance under this Agreement, UCITA does not govern any aspect of this Agreement or any license granted under this Agreement, or any of the parties' rights or obligations under this Agreement. The governing law will be that in effect prior to the applicability of UCITA.

13.5. THIRD PARTY BENEFICIARIES. This Agreement is entered into solely for the benefit of Motorola and Licensee. No third party has the right to make any claim or assert any right under this Agreement, and no third party is deemed a beneficiary of this Agreement. Notwithstanding the foregoing, any licensor or supplier of third party software included in the Software will be a direct and intended third party beneficiary of this Agreement.

13.6. SURVIVAL. Sections 4, 5, 6.3, 7, 8, 9, 10, 11 and 13 survive the termination of this Agreement.

13.7. ORDER OF PRECEDENCE. In the event of inconsistencies between this Exhibit and the Primary Agreement, the parties agree that this Exhibit prevails, only with respect to the specific subject matter of this Exhibit, and not the Primary Agreement or any other exhibit as it applies to any other subject matter.

13.8 SECURITY. Motorola uses reasonable means in the design and writing of its own Software and the acquisition of third party Software to limit Security Vulnerabilities. While no software can be guaranteed to be free from Security Vulnerabilities, if a Security Vulnerability is discovered, Motorola will take the steps set forth in Section 6 of this Agreement.

Exhibit B
PAYMENT SCHEDULE

UPON COMPLETION OF DDR (DETAILED DESIGN REVIEW AFTER MPSCS DDR)	20%	\$ 1,552,083.56
UPON SHIPMENT OF THE INFRASTRUCTURE EQUIPMENT	60%	\$ 4,656,250.68
SERVICES AS PERFORMED	10%	\$ 776,041.78
UPON COMPLETION OF FINAL ACCEPTANCE	10%	\$ 776,041.78
		\$ 7,760,417.80

Exhibit C
The Proposal
Dated September 19, 2016

Exhibit D (If Applicable)

Exhibit E

System Acceptance Certificate

Customer Name: DTE Energy Company

Project Name: DTE /MPSCS

This System Acceptance Certificate memorializes the occurrence of System Acceptance. Motorola and Customer acknowledge that:

1. The Acceptance Tests set forth in the Acceptance Test Plan have been successfully completed.
2. The System is accepted.

Customer Representative:

Motorola Representative:

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

FINAL PROJECT ACCEPTANCE:

Motorola has provided and Customer has received all deliverables, and Motorola has performed all other work required for Final Project Acceptance.

Customer Representative:

Motorola Representative:

Signature: _____

Signature: _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Exhibit F

TERMS AND CONDITIONS FOR SERVICES

1. DEFINITIONS

The following terms shall have the following meanings:

- A. *Agreement* means these terms and conditions, the document called the Purchase Order and/or Contract as executed by the parties, and all of the documents listed in the Purchase Order and/or Contract which are specifically incorporated into this Agreement.
- B. *Buyer* is Company's purchasing representative whose name appears on the face of the Purchase Order and/or Contract and who is the only Company representative authorized to issue Change Orders.
- C. *Change Order* is the document issued by Buyer that alters, amends or modifies the Agreement.
- D. *Company* means the DTE Energy entity stated on the first page of the Purchase Order and/or Contract.
- E. *Contract Administrator* is Company's principal representative who has the responsibility to coordinate and administer the Agreement.
- F. *Contractor* means the person or legal entity with whom Company has entered into the Agreement.
- G. *Project* means the Company property or other specified location(s) where the Work shall be performed and may include construction by other contractors under a separate agreement with Company.
- H. *Schedule* means the time(s) established for the performance of the Work.
- I. *Subcontractor* is any person or other entity doing any portion of the Work on behalf of Contractor. Nothing in the Agreement shall create any contractual relationship between Company and any subcontractor.
- J. *Supplier* is any person or other entity supplying material, equipment or goods in connection with the Work on behalf of Contractor.
- K. *Work* is the entire responsibility of Contractor for services and labor to be performed and equipment and materials to be furnished by Contractor as defined by the Agreement and includes all other labor, materials, equipment, licenses, permits, repairs or replacements under any warranty, insurance and services provided or to be provided by Contractor to fulfill Contractor's obligations.

2. ENTIRE AGREEMENT

- A. The Purchase Order and/or Contract, together with these Terms and Conditions and all documents referenced and specifically incorporated into the Purchase Order and/or

Contract are the entire agreement between the Parties respecting the Work and no modification of the Agreement shall be effective unless by a Change Order issued by Buyer. Any agreements, negotiations or understandings of the Parties prior or contemporaneous to the date of the Agreement, whether written or oral, are superseded hereby.

- B. Any document submitted by Contractor (including any Contractor document referenced in the Agreement), is used solely for the purpose of describing the Scope of Work and to the extent containing any terms in addition to or inconsistent with the terms of the Agreement, or a rejection of any terms of the Agreement, shall be deemed to be a counter offer to Company and shall not be binding upon Company unless specifically accepted in writing by Buyer. In the absence of written acceptance of such counter offer by Company, commencement of performance by Contractor shall be deemed to be an agreement by Contractor to perform in accordance with the terms of the Agreement and an acceptance hereof, notwithstanding any prior dealings or usage of trade.

3. SCOPE OF WORK

Contractor agrees to furnish labor, supervision, materials, equipment and tools and technical and professional services necessary to carry out the Work specified in the Agreement. Contractor may not perform extra work except by an executed Change Order issued by Buyer.

4. TERM OF AGREEMENT

This Agreement shall be effective and terminate on the dates specified in the Purchase Order and/or Contract.

5. INDEPENDENT CONTRACTOR

A. Contractor and all its employees, Subcontractors and Suppliers are, with respect to Company, independent contractors. Except as otherwise expressly provided herein, Contractor shall perform all services, furnish all labor and supervision, do all work, and provide all equipment, materials, tools and supplies as are necessary or incidental to the complete performance of its obligations as required and described in the Agreement. Contractor shall be solely responsible for the performance, general direction, supervision and efficient administration of the Work of its employees, Subcontractors, Suppliers and those under its control. Any rights to inspect, reject, approve or otherwise oversee the Work, or other similar provisions regarding the conduct of the Work, including safety rules and practices, are for Company's benefit only (and not for any other person or entity) and do not relieve Contractor of its responsibilities.

- B. Contractor shall be responsible for any and all wages, taxes, or benefits that are due and owing to its employees, including personnel or compensation records, computation of compensation, unemployment compensation, overtime and fringe benefits or performance of such other duties and obligations as are required to comply with any and all applicable federal, state and local laws, ordinances, rules and

regulations. Contractor shall require the same of its Subcontractors and Suppliers.

6. LAWS, REGULATIONS AND PERMITS

A. Contractor shall keep itself fully informed of and shall observe and comply with all federal, state and local laws, ordinances, codes and regulations including, but not limited to, environmental and pollution control laws; orders and decrees of bodies or tribunals having any jurisdiction or authority over the Work; and any rules or regulations of Company relating to health, safety or performance of the Work which in any manner affect those engaged or employed for any Work, the materials and equipment used in any Work, or the performance of any Work. If any discrepancy or inconsistency should be discovered between the Agreement and any such law, ordinance, code, regulation, order or decree, Contractor shall immediately report the same in writing to Buyer. Contractor shall be responsible for the compliance by its employees, Subcontractors and Suppliers of all tiers with the above provisions and shall be liable for all fines levied in violation of any laws, ordinances, codes and regulations.

B. Unless otherwise directed by Company, Contractor shall procure and pay for all other permits and inspections and furnish any bonds, security or deposits required for the Work.

7. FEDERAL CONTRACTING REQUIREMENTS

As a federal contractor, Company requires that Contractor agree to be bound by and comply with the following clauses which are incorporated by reference herein and have the same force and effect as if set forth in full text.

A. The following Federal Acquisition Regulation ("FAR") and Code of Federal Regulations ("CFR") clauses, as amended, are incorporated by reference in these terms and conditions unless Contractor is exempt thereunder: Equal Opportunity, FAR 52.222-26 (applies to all orders); Prohibition on Segregated Facilities, FAR 52.222-21 (applies to all orders); Affirmative Action for Workers with Disabilities-FAR 52.222-36 (applies to orders of \$10,000 or more); Anti-Kickback Procedures, FAR 52.203-7 (applies to all orders over \$100,000); Notice of Employee Rights Concerning Payment of Union Dues or Fees, 29 CFR Part 470 (applies to all orders over \$100,000); Affirmative Action for Special Disabled and Vietnam Era Veterans-FAR 52.222-35 (applies to orders of \$25,000 or more); and Employment Reports on Disabled Veterans and Veterans of the Vietnam Era-FAR 52.222-37 (applies to orders of \$25,000 or more). The terms "Contractor," "Government," and "Contracting Officer" as used in the FAR clauses shall be deemed to refer to "Contractor," "Company" and "Contract Administrator."

B. Except to the extent that this Agreement is exempt from any of the requirements set out below, Contractor agrees to be bound by and comply with the clauses set forth at 48 CFR 52.219-8 (Utilization of Small Business Concerns) (only if this Agreement exceeds \$100,000) and 48 CFR 52.219-9 (Small Business Subcontracting Plan) (only if this Agreement exceeds \$500,000 and if Company requests submission of a Small Business Subcontracting Plan).

8. U.S. DEPARTMENT OF TRANSPORTATION CONTRACTOR PERSONNEL QUALIFICATIONS

A. If Contractor is performing work on a pipeline facility, that is

an operations or maintenance task required by 49 C.F.R. Part 192 or Part 195, and affects the operation or integrity of the pipeline, Contractor shall develop and maintain, acquire, and/or participate in a written program to ensure that its employees are qualified to perform the work ("Covered Tasks") encompassed within this Agreement. The written program shall be consistent with the requirements of 49 CFR Part 192, Subpart N Qualification of Pipeline Personnel. At a minimum Contractor's program shall:

1. Ensure through evaluation that individuals performing covered tasks are qualified to perform the Covered Tasks, and recognize and react to abnormal operating conditions they may encounter while performing Covered Tasks.

2. Allow individuals that are not qualified to perform a Covered Task if directed and observed by an individual that is qualified. Note: Qualified individuals shall be trained on their responsibility for directing and observing individuals performing Covered Tasks for which they are not qualified.

3. Suspend the qualification of an individual, if Contractor has reason to believe that the individual is no longer qualified to perform a Covered Task. The individual's qualification may be reinstated when Contractor has completed an investigation, and determined and documented the reason why the suspension no longer applies, or the individual's ability to perform the Covered Task has been established consistent with the documented evaluation process.

4. Communicate changes that affect Covered Tasks to individuals performing those tasks, before the changes become effective.

5. Maintain and provide records that demonstrate compliance with Contractor's qualification program.

B. Contractor's program shall be submitted to Company for review and is subject to audit by Company or its' designee, at any time. Contractor and its employees shall fully cooperate during such audits, and make available copies of any documents, training and qualification materials, and records to support such audits.

C. Contractor shall notify Company, within three working days, of any individual whose qualification is suspended. The circumstances leading up to the suspension and the results of any investigation or evaluation shall be provided to Company within 10 working days of completion of any investigation or evaluation.

D. Company shall qualify Contractor's employees or verify that they are qualified to perform the following Cover Tasks plastic joining, welding, and clockspring. Company shall notify Contractor when this shall happen. Contractor and its employees shall fully cooperate in such qualification. In the event Contractor cannot make employees available, consistent with the schedule for qualification or verification, Company may charge Contractor for necessary make up sessions.

9. U.S. DEPARTMENT OF TRANSPORTATION DRUG AND ALCOHOL TESTING COMPLIANCE

A. Contractor shall comply with all applicable controlled

substance and alcohol testing, education, and training requirements set forth by the U.S. Department of Transportation (DOT) and the Research and Special Projects Administration (RSPA) in their regulations for employees or subcontractor's employees who perform construction operation, maintenance or emergency-response functions on a pipeline or LNG facility as defined therein. Contractor shall also comply with all applicable alcohol and controlled substance testing requirements set forth by the Federal Highway Administration (FHA) for employees or subcontractor's employees whose job requires a commercial driver's license.

B. Contractor and its Subcontractors shall maintain the records specified under such requirements and allow access to such records and to their property by Company, any duly authorized DOT, RSPA or FHA official and any representative of any State agency charged with the duty of monitoring compliance with DOT, RSPA or FHA requirements. Contractor shall monitor the compliance of all Subcontractors working under it, either directly or through subcontract, and Contractor shall include this compliance requirement in each of its subcontracts. Company reserves the right to require modifications to Contractor's compliance procedures if Contractor is found at any time to be out of compliance with DOT, RSPA or FHA regulations, and the costs of such modifications shall be borne by Contractor.

10. STANDARDS AND CODES

Contractor shall comply with all industry standards and codes applicable to the Work.

11. DISCOVERY OF ERRORS, OMISSIONS OR DISCREPANCIES IN THE AGREEMENT

If at any time Contractor discovers any errors, omissions, discrepancies, or conflicts in the Agreement, it shall inform Buyer in writing. Company shall clarify such matters and so inform Contractor in writing, and where necessary, Buyer shall issue a Change Order to amend the Agreement accordingly.

12. SAFETY

A. Contractor shall take all necessary precautions for the protection of the health and safety of its employees, its Subcontractors and Suppliers, Company, the public and other third parties and shall at all times comply with Company's safety rules and procedures applicable to the Work. Contractor agrees that it shall be solely responsible and liable for the safety of its employees. Contractor agrees to cooperate with Company in efforts to prevent injuries to workers employed by either party or other contractors in performing the Work.

B. Contractor shall not commence the Work prior to participating in a preconstruction safety meeting with a Company safety representative. Company's safety representative may periodically review the performance of Contractor's Safety Program.

C. Contractor shall also ascertain and comply with all federal, state and local laws, ordinances, standard rules, regulations and executive orders, including all OSHA and MIOSHA requirements, relating to safety and health, accident or injury of its employees and subcontractors on, about, or adjacent to the premises where the Work is being performed. Contractor shall require the same of its Subcontractors.

13. SECURITY AND PROHIBITED ITEMS

A. Company may furnish security personnel at the Project to control access, patrol yards and buildings, maintain order, and enforce regulations. The presence or absence of such security services shall not be construed to modify the responsibility of Contractor for loss and/or damages to persons or property within its custody or control.

B. Certain items are prohibited from the Project under all conditions. These items include alcoholic beverages, controlled substances, drugs, firearms and hunting devices. The security personnel may conduct periodic, random inspections of vehicles, lunch boxes, coolers, cartons or other containers brought on to the Project.

14. CONFIDENTIALITY – See CSA Section 15

15. TAXES – See CSA Section 16.1

C. Unless otherwise provided in the Agreement, Contractor shall pay all Michigan sales and use taxes on all materials used in performing the Work.

16. INSURANCE – See Exhibit G – Insurance Requirements

17. INDEMNIFICATION – See CSA Section 13

18. ENVIRONMENTAL COMPLIANCE

A. Waste. Contractor may not place material in any Company waste storage containers, including but not limited to: rubbish dumpsters, used oil drums and tanks, hazardous waste drums, satellite waste collection drums and recycling containers without prior written consent from Contract Administrator. No waste of any sort may be disposed to any Company drains or ditches without prior written agreement from Contract Administrator (including but not limited to solvents, oily waste, and janitorial supplies). Contractor is responsible for all clean up and disposal of wastes generated or resulting from work activities unless otherwise specified in the contract. Contractor must use Company's Environmental Management and Resources Department approved (or obtain approval for) transportation and disposal facilities for the disposition of all waste. Hazardous or liquid industrial waste shall be packaged, labeled, manifested and disposed of with the prior approval of Contract Administrator. Manifested waste generated at Company's Fossil Generation facilities shall be signed by the Company Environmental Professional at the facility. Any cost incurred by the Company to dispose of Contractor generated waste left behind at the work location will be the responsibility of Contractor unless otherwise specified in the Agreement.

B. Chemicals. Not Applicable

C. Tanks. Not Applicable

D. Spills. Not Applicable

E. Compliance. Contractor and Subcontractors shall conduct activities on Company property in compliance with all environmental federal, state, and local regulations. Contractor and its Subcontractors or Suppliers shall not conduct activities

that result in the Company exceeding any environmental permit limitation or condition. In the event Contractor's or its subcontractors' work causes a permit exceedance or noncompliance, Contractor shall be responsible for any fines or costs associated with such exceedance or non-compliance. Contractor shall inform Contract Administrator prior to any planned activity expected to result in a discharge to the environment, including but not limited to, surface water, air, ground and city sewer.

F. Environmental Management System. Company is committed to continually improving environmental performance. As part of this commitment, Company has certified some facilities' environmental management systems (EMS) to the ISO 14001 standard. Contractor shall ensure that its employees, Subcontractors and/or Suppliers performing work at a facility with a certified EMS read the "ISO 14001 Environmental Management System Handbook". An acknowledgement page from each handbook shall be signed and submitted to Contract Administrator. Contractors shall ensure that its Subcontractor(s), Suppliers and employees' actions comply with the requirements of a facility's EMS. Any damage or delays caused by the work release shall be at the Contractor's expense.

19. CONTRACTOR'S EMPLOYEES AND MANAGEMENT

A. Contractor shall be solely responsible for and have control over the means, methods, techniques, sequences, procedures and coordination of all portions of the Work under the Agreement.

B. Contractor shall be responsible to Company for the acts and omissions of Contractor's employees, Subcontractors, Suppliers, their agents and employees, and other persons performing the Work for Contractor.

C. Contractor's agents, employees, Subcontractors and Suppliers who are working on Company premises shall comply with all federal, state and local laws, ordinances, codes and regulations, and Company policies prohibiting unlawful discrimination and harassment. Contractor shall be responsible to Company for compliance by its employees, agents, Subcontractors and Suppliers with the above provisions.

D. Contractor shall perform the Work diligently and maintain at all times a sufficient number of competent and highly skilled employees and supervisors to complete the Work timely, properly, and in a workmanlike manner in accordance with the highest industry standards. Unless specifically waived by Company, a competent Contractor's designated representative shall be at the site at all times during working hours to supervise the Work. Such Work shall be conducted in cooperation with Company's supervisors, engineers, or other Company employees and contractors in such manner that Company's operations shall not be interrupted unnecessarily.

E. At Company's request, Contractor shall remove any employee, Subcontractor or Supplier that Company deems incompetent, disorderly, insubordinate, careless or otherwise objectionable, without cause, at any time.

F. Contractor shall at all times maintain discipline, under established work rules and procedures, among its own and its Subcontractor's and Supplier's employees. Labor to be employed shall be such as to cause no conflict or interference with or between the various trades. Contractor shall be responsible for all agreements with labor and for the resolution of all labor problems or disputes. Contractor shall keep the Contract Administrator and Buyer fully informed of all developments in labor relations that affect or could affect the Project.

G. The Work is to be conducted in conformance with the standard work week of particular trade(s) involved or conditions of the labor agreements applicable to the Work on the basis of straight time, regular shift work, unless otherwise authorized by Contract Administrator, if such Work is included as part of the Agreement, or Buyer, if such Work changes the Agreement. Contractor shall not pay wages, overtime rates, shift rates or any allowances including travel, subsistence and other fringe benefits, if any, in excess of those stated in the applicable labor agreements, or engage in practices which are not a part of terms and conditions of labor agreements, including a shortened work week, unless authorized by Buyer.

H. Company may direct Contractor, whenever Company deems it necessary, to supply and furnish to Contractor's and its Subcontractor's and Supplier's employees and agents Company approved identification badges, passes or both. Contractor shall not, in any event, admit to the Project any person who does not have proper credentials sufficient to establish that such person has a legitimate purpose for being on or about the Project.

I. Contractor's organization shall include professional management personnel to support the Work and to interface with Company's management regarding labor relations, planning, scheduling, material quantity take-offs, estimating, quality control and technical matters. Management skills include engineering expertise and other disciplines associated with the Work.

J. Contractor shall take all reasonable and appropriate steps, including but not limited to, prompt initiation of legal proceedings to end any illegal work stoppages, slowdowns or other labor disturbances, and if it fails to do so, it shall be liable for all damages incurred by Company as a result of such illegal labor disruptions.

20. HIRING AND SUBCONTRACTING

A. Contractor shall not hire aliens who are unauthorized or ineligible for U.S. employment at Contractor, pursuant to the Immigration and Nationality Act as amended (INA). Contractor shall comply with the INA verification and retention requirements for its employees hired after November 6, 1986, and with such other applicable requirements of employers as have been or will be issued, pursuant to the INA, or pursuant to the authority of the Department of Homeland Security and U. S. Citizenship and Immigration Services (USCIS) or their successors.

B. Contractor shall not commence any Work prior to notifying

Company of any Subcontractors and/or Supplier, ensuring that its Subcontractors and/or Suppliers meet Company safety requirements and receiving Company's concurrence of such Subcontractor and/or Supplier for performance of the Work. Any assignment, delegation or subcontract shall not relieve Contractor of its responsibility to complete the Work in accordance with the terms of this Agreement or its liability for any Work performed by its subcontractors, employees or agents.

C. Contractor shall incorporate the obligations of this Agreement into its respective Subcontracts, agreements and purchase orders (a copy of which is to be submitted to Company upon request). Company is the intended third party beneficiary of all contracts for design, engineering or consulting services, all trade contracts, subcontracts, purchase orders and other agreements between Contractor and third parties. Contractor shall fully defend, indemnify and hold Company harmless from all acts or omissions of all Subcontractors as if they were company's acts and omissions.

D. Contractor shall require its Subcontractors to carry insurance in the amount, type and form of insurance required by the Agreement. If its Subcontractors do not obtain such coverage, Contractor shall insure the activities of its Subcontractors.

21. COOPERATION AND OTHER CONTRACTS

A. Company may undertake or award other contracts for work on the Project. Throughout the term of the Agreement, close cooperation between Company, Contractor and any other contractors and subcontractors performing any work is to be maintained in order to (1) avoid interference with the work of Company, other contractors, or with the operation or maintenance of Company's existing facilities, and (2) ensure that adequate safety precautions and protections are provided and utilized whenever appropriate. Contractor shall cooperate with Company to schedule its Work so as to avoid interference with the performance of work by other contractors, subcontractors or Company.

B. Contractor must anticipate that its Work may be interfered with or temporarily delayed from time to time on account of the concurrent performance of work by others. Company may require that certain facilities be used concurrently by Contractor and other persons or entities.

22. MATERIALS AND EQUIPMENT

A. Contractor shall receive, unload, store, warehouse, protect, handle and maintain all materials, tools and equipment whether supplied by it, Company or others for Contractor's use.

B. Contractor agrees that the location and size of lay down areas are within Company's sole discretion and that Company's or another contractor's activities on the Project may limit the lay down area or areas available to Contractor.

23. PROTECTION OF PROPERTY AND EQUIPMENT

A. Contractor shall at times take adequate precautions to Company's satisfaction, to protect Company's property and adjoining property from damage.

B. Unless otherwise specified in the Agreement, all Work is to be performed without interruption of service to Company's customers, consistent with Company's safety rules and practices. If, in Contractor's opinion, it shall be necessary to interrupt service, Contractor shall advise the Contract Administrator as soon as possible in advance of the anticipated interruption. If Company determines, in its sole discretion, that interruption is necessary, it shall make all arrangements and shall advise Contractor of such arrangements. If Company determines it is not necessary, Contractor shall proceed with the Work without such interruption.

C. Public utility facilities, such as plant generating equipment, communications and power lines, gas and water mains, telephone and other cables and structures and the like, are not to be moved or otherwise tampered with until suitable arrangements with the company owning or operating such facilities are completed. Contractor shall, if appropriate, contact MISS DIG®. Contractor shall notify Company reasonably in advance of commencing any Work in the vicinity of such facilities and shall make all necessary arrangements without loss of time or interference with Company's schedules.

24. SITE SERVICES AND FACILITIES

Contractor shall, unless otherwise specified in the Agreement, provide all ancillary facilities necessary for proper execution and completion of the Work. The term "ancillary facilities" means temporary construction facilities such as portable water, sanitary and storage facilities, heat and ventilation, telephone service, offices, warehouses and other ancillary supplies, materials and equipment necessary or appropriate for the conduct of the Work. Before erecting or otherwise installing such ancillary facilities, Contractor shall furnish Company, at its request, drawings and other information concerning such ancillary facilities.

25. INSPECTION

A. Contractor is responsible for inspection of all materials and workmanship. However, all equipment, materials and work shall at all times be subject to inspection and testing by Company. Company shall have the right to reject equipment, materials and work not complying with the requirements of this Agreement. Company shall notify Contractor in writing that such materials, equipment or work are rejected. Thereupon, rejected work shall be satisfactorily corrected, and rejected equipment and material shall be satisfactorily repaired or replaced with satisfactory material and equipment, all in accordance with the Agreement and at the expense of Contractor. Contractor shall promptly segregate and remove rejected materials and equipment from the premises.

B. Company shall perform inspections in such manner as not

to delay the Work unreasonably, and Contractor shall perform its work in such manner as not to delay inspection unreasonably. Contractor shall give Company reasonable advance notice of operations requiring special inspections or tests, and may request inspection of a portion of any work at any time by reasonable advance notice to Company.

C. Inspection of materials and finished articles to be incorporated into any Work may be made by Company at the place of manufacture or shipment. Contractor shall make

provisions for such inspections with its Suppliers and Subcontractors. When such inspections are required by the Agreement, no such materials or finished articles shall be shipped from such place of inspection or incorporated in any Work prior to inspection or without a written waiver of such inspection by Company.

D. No acceptance of equipment, materials or work shall be construed to result from inspection of the Work in progress by Company. Any inspections or tests or waivers thereof shall not relieve Contractor of its responsibility for meeting the requirements of the Agreement.

E. Nothing herein set forth shall be construed as requiring Company to inspect or otherwise examine the method, manner and means by which Contractor performs the Work or Contractor's safety practices or adherence to applicable laws, regulations, codes, ordinances and common trade or industry practices and standards, all of which shall be Contractor's sole responsibility.

26. CLEANUP OF SITE

A. Contractor shall, at all times, keep its work areas and premises and access to such areas and premises in a neat, clean and safe condition. Unless otherwise specified, clean means "broom clean." If Contractor fails to comply with any of the obligations of this Section, the same may be accomplished by Company at Contractor's sole expense.

B. Upon completion of any portion of any Work, Contractor shall promptly remove all of its equipment, temporary structures, waste and surplus construction and other materials and ancillary facilities not to be used at or near the same location during later stages of Work. Upon completion of any Work and before final payment is made, Contractor shall, at its expense, satisfactorily dispose of all ancillary facilities, rubbish waste, unused materials and other equipment and materials belonging to it or used in the performance of the Work, and Contractor shall leave the work areas and premises in a neat, clean and safe condition.

27. WORK AREAS AND ACCESS

A. All areas on the Project shall be allocated and scheduled by Company. Contractor shall confine its office, shops, storage and equipment parking to the area assigned by Company.

B. Company's representatives and all duly authorized representatives of governmental agencies having jurisdiction over work areas or any part thereof shall at all reasonable times, for the purpose of determining compliance with Agreement or other requirements, have access to such areas and the premises used by Contractor.

28. USE OF COMPLETED PORTIONS OF THE WORK – See CSA Section 8

29. WARRANTY - MATERIALS AND WORKMANSHIP – See CSA Section 9

30. WARRANTY – ENGINEERING – See CSA Section 9

31. LICENSE, PATENTS AND COPYRIGHTS – See CSA Section 13.3 and Exhibit A

32. OWNERSHIP OF INFORMATION – Not Applicable.

33. WARRANTIES AND INDEMNITY - PATENTS, TRADEMARKS, AND PROPRIETARY RIGHTS – See CSA Section 13.3

34. COMPANY'S RIGHT TO PERFORM THE WORK – See CSA Section 12

35. COMPANY'S RIGHT TO STOP THE WORK

If Contractor neglects to perform the Work, fails (1) to correct defective Work, (2) to supply materials or equipment in accordance with the Agreement, or (3) to provide Company with timely notification of certain events affecting performance of the Work which may include, but are not limited to, damage to right of way or property and environmental concerns, and to correct same, Company may, without prejudice to any other rights or remedies available to it, order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated. Such work stoppages as well as elimination of the cause therefore shall not result in any additional costs to Company nor in any extension of the completion date set forth in the Agreement unless otherwise agreed in writing by Company.

36. SCHEDULE AND PROGRESS

A. All time periods or limits stated in this Agreement, including, but not limited to, the Date of Commencement of the Work and the Date of Completion set forth in the Agreement, are of the essence.

B. Contractor shall, unless otherwise specified, within ten (10) days after the date of this Agreement, submit to the Contract Administrator for approval, a Schedule that provides for the orderly, practicable and expeditious completion of the Work in a format appropriate for the Work which takes into account Contractor's Subcontractors and Suppliers, material and equipment delivery schedules, and the relationship of the Work to other activities on the Project and at the site.

C. Within ten (10) days of Company's receipt of the Schedule, unless otherwise specified, Company shall either approve the Schedule or return it to Contractor for revision. If returned, Contractor shall submit a revised Schedule to Company for approval.

D. Contractor shall furnish to Company every thirty (30) days an updated Schedule that reflects the status of the Work and incorporates all changes to the Schedule.

E. Company intends to rely upon the approved Schedule for the scheduling of the work for itself and others, and Contractor shall be liable, in addition to any of the remedies of Company set forth in this Agreement, for any impacts upon itself or others resulting from Contractor's or its Subcontractor's and/or Supplier's failure to abide by the Schedule and/or failure to update the Schedule as required by this Section.

F. If at any time during the progress of the Work, Contractor's actual progress appears to Company to be inadequate to meet the requirements of the Agreement, Company may notify Contractor of such imminent or actual non-compliance with the Agreement. Contractor shall thereupon submit a recovery plan to Company for approval and take steps such as overtime or multiple shifts, at Contractor's expense, as may be necessary to improve its progress. Neither such notice by Company or Company's failure to issue such notice shall relieve Contractor from its obligation to achieve the quality of work and rate of progress required by the Agreement or liability for delay.

G. Contractor shall provide notice to the Contract Administrator at least ten (10) days prior to starting the Work or taking measurements preparatory for such commencement. On the day before commencement of the Work, Contractor shall also communicate with the Contract Administrator.

37. PAYMENT

A. Invoices for Work performed shall be submitted on a timely basis, in the manner, frequency and form, and with such supporting documentation, including acknowledgment of receipt of work by Company, as required by the Agreement. Company shall pay approved invoices, less any retainage specified in the Agreement, in accordance with the payment terms specified in the Agreement or shall notify Contractor of its reasons for disapproval of such invoices.

B. Contractor shall promptly pay its Subcontractors, Suppliers, laborers, fringe benefits and other costs upon receipt of each payment the respective amounts allowed Contractor on account of the Work performed and to the extent of each interest therein.

C. Company may at any time require that invoices covering materials and equipment furnished or labor and services performed, be accompanied by sworn statements, waivers of lien and other documents as provided for by the Michigan Construction Lien Act, MCL 570.1101, *et seq.* If such documents are requested, the invoice shall not be paid until such documentation is supplied. Notwithstanding anything herein to the contrary, Company may, prior to paying any invoice, demand a waiver of lien on any item stated in the sworn statement or invoice, and withhold from any payment to Contractor an amount sufficient to cover all items for which a waiver of lien is not produced by Contractor. Company may, at its option, pay such amounts directly to Subcontractors, Suppliers or other lien claimants with notice of such payment to Contractor, and deduct such amounts from any payment to Contractor or withhold, without interest, any payments otherwise due by Company to Contractor because of any claim arising out of this or any other transaction with Company.

D. Contractor shall defend, Indemnify and hold harmless Company from any and all claims, demands, causes of action and/or costs, including reasonable attorney fees, attributable to Contractor's failure to make any payments required by the Agreement. Nothing in this Section or Agreement shall imply or infer an obligation of Company to make payment to any party other than Contractor.

38. COMPLETION AND FINAL PAYMENT – See CSA Section 8

39. LIENS

A. Contractor, as directed by Company, shall, at its own expense, obtain a prompt discharge of any lien or liens arising out of the Work, which may be filed against Company's property. Waivers of all liens arising out of this Agreement, or discharges in full thereof shall be submitted with Contractor's request for final payment.

B. If any lien is filed, payment for the Work or any other payments due under this Agreement or any other agreement between Contractor and Company shall not be made until Contractor offers proof that said lien has been removed. Contractor shall be responsible for all costs, including legal fees, associated with the removal of said lien.

40. SET OFF

Company shall be entitled at any time to set off any sums legally determined to be owed by Contractor or any of Contractor's affiliated companies, to Company or to any of Company's affiliated companies, against sums payable by Company.

41. CHANGES – See CSA Section 3.2

42. DELAYS

A. If Contractor is delayed in the performance of the Work by any act or omission of Company, its representatives, other contractors, Subcontractors or Suppliers (other than Contractor's Subcontractors and Suppliers) or any other event affecting Contractor, Company, any other contractors, or subcontractors on the Project which could not be reasonably foreseen and guarded against and Contractor is without fault or negligence, then Contractor shall receive an extension of time only equivalent to the time that the performance of the Work as a whole was delayed, without any increase in compensation.

B. Promptly upon the onset of the delay, Contractor shall provide written notice to the Contract Administrator. As soon as possible, but not more than ten (10) days after the delay or at the next scheduled update of the Schedule, whichever is earlier, Contractor shall provide the Contract Administrator with a detailed description and probable duration of the delay, the specific portion of the Work affected, and the requested extension of time. Failure to provide such notices shall be a waiver of any claims of Contractor arising from such delay.

C. If Contractor is responsible for a delay in the progress of the Work, Contractor shall, without additional cost to Company, immediately work such overtime, acquire necessary additional equipment or perform such other acts as may be necessary to avoid delay in the completion of the Work.

D. Company may, if it deems necessary, assist Contractor with expediting drawings, equipment and material to be furnished under the Agreement. Company shall be allowed reasonable access to Contractor's plants, and those of its subcontractors and suppliers, for expediting purposes.

43. SUSPENSION

A. Company may at any time for any reason order Contractor, upon one (1) day's written notice, to suspend, or interrupt all or any part of the Work for such period of time as appropriate for the convenience of Company. Upon receipt of such Notice, Contractor shall suspend the Work on the date and to the extent specified in the Notice.

B. If the performance of all or any part of the Work is suspended by Company, an adjustment shall be made for any increase in the cost and time of performance of this Agreement caused by such suspension. However, no adjustment shall be made under this Section for any suspension to the extent that performance would have been so suspended, delayed, or interrupted by any other Section of this Agreement, including due to the fault or negligence of Contractor.

C. Upon such suspension, Contractor waives all claims for damages, including, but not limited to, loss of profits, idle equipment, labor and facilities, and any claims of its Subcontractors and Suppliers. Contractor's sole compensation for any suspension under this Section shall be either reasonable demobilization or standby costs as agreed to by Company.

D. Upon receipt of notice to resume the suspended Work, Contractor shall resume performance to the extent required in the notice and, within ten (10) days, submit to Company a revised Schedule for review that reflects the effect of the suspension on the Schedule. Contractor shall be reimbursed for its reasonable mobilization costs.

44. TERMINATION FOR CONVENIENCE

A. Company may at any time, for any reason, terminate this Agreement, in whole or in part, upon ten (10) days written notice to Contractor. The notice must explicitly state the effective date of the termination and whether the contract termination is in whole or in part, and if in part, which part is being terminated. Upon receipt of such notice, Contractor shall discontinue work on the date and to the extent specified in the notice and shall thereafter do only such work as may be necessary to preserve and protect the Work already in progress and to protect materials, plant and equipment at the Project or in transit to the Project.

B. Upon such termination, Contractor waives all claims for damages as a result of such termination including, but not limited to, loss of profits, idle equipment, labor and facilities, and any claims of Subcontractors or Suppliers as a result of such termination, and shall accept the value of all Work completed through the date of termination as sole and complete compensation. No termination fee(s) shall be payable by Company.

C. The value of all Work shall be calculated using the value for all Work satisfactorily completed at the Project and all specially manufactured goods completed at other locations or work in progress if delivered, but not including any goods that are Contractor's (or any of its Subcontractor's or Supplier's) inventory or not acquired at the direction of Company. Unit prices shall be used to determine

value. If there are no unit prices, value shall be determined on a percent-complete basis in relation to the Agreement price.

45. CANCELLATION FOR DEFAULT – See CSA Section 12

46. FORCE MAJEURE – See CSA Section 10.1

47. DISPUTE RESOLUTION – See CSA Section 11

48. LOSS OR DAMAGE – See CSA Section 5.3

49. REMEDIES AND LIMITATIONS

A. Upon discovering any breach of this Agreement by Contractor, Company may pursue any and all remedies available under law, including, but not limited to, requiring Contractor, at its expense, to replace defective materials and equipment, to re-perform defective work, and to replace or repair any materials, equipment, or other Company property damaged as a result of Contractor's breach. In the event of an emergency when, in the judgment of Company, delay could cause serious loss or damage, repairs or adjustments may be made by Company or a third party chosen by Company, and the cost of the work shall be paid by Contractor and may be deducted from any amounts owing to Contractor under this Agreement or otherwise.

B. Except as may be expressly stated elsewhere in this Agreement, neither party shall be liable to the other party for incidental, indirect, or consequential damages, including, but not limited to, loss of profits or revenue.

50. LIQUIDATED DAMAGES – Not Applicable

51. REPORTING OF ACCIDENTS

Contractor shall notify Company's representative on the Project and shall comply with the following telephone reporting procedure in the event that its employee(s) or its subcontractor's or supplier's employee(s) sustain a serious personal injury (any injury which requires admittance to a hospital) or a fatality occurs arising out of the Work performed under the Agreement.

1. Between the hours of 8:00 a.m. and 5:00 p.m. eastern time, Monday through Friday, the Legal Investigations Division of Company's Legal Department (313-235-7705) shall be notified immediately.

2. Between the hours of 5:00 p.m. and 8:00 a.m. eastern time, Monday through Friday, weekends and holidays, the Company switchboard (313-235-8000) shall be notified. It shall in turn relay the report to the Legal Department representatives on call. In addition to this telephone reporting procedure, Contractor shall also submit to the Legal Investigations Division of Company's Legal Department a written follow-up accident report form (available from the Contract Administrator) within 24 hours after the occurrence, as well as a written accident report in all other cases requiring more than first aid treatment. Contractor shall also furnish Company with a copy of all claims submitted to its insurance companies.

52. CONTRACTOR SUBMITTALS

A. Unless otherwise specified in the applicable scope of work,

Contractor shall submit documents to Company for information, review, and approval in accordance with the requirements of the Agreement.

B. Unless otherwise specified in an applicable scope of work, Contractor shall submit record documents that represent the final

- "As Built" – configuration. These As Built documents shall have all changes incorporated into them or marked on them and shall fall into the following two groupings:

1. Unchanged / built per design
2. Updated /As Built documents that were revised based on:
 - a. Requested by Company
 - b. Necessary as a result of Company comments
 - c. Required due to field changes

C. The deliverable form of the drawings shall be as follows:

1. If Contractor has not produced the new two dimensional or isometric drawings or has not revised Company's drawings, then Contractor shall submit the following:

a. Two (2) sets of record/As Built drawings in the form of "Marked UP" drawings (specifically color coded as red in, green out, blue for comments) per the scope of work.

b. An Excel database listing all As Built drawings that were submitted.

2. If Contractor has produced the new two dimensional or isometric drawings or has revised Company's drawings, then Contractor shall submit the following via Compact Disk (CD) or other agreed to media per the scope of work:

a. One (1) set of As Built drawings, P&IDs, S/D & W/Ds and equipment arrangement drawings in the form of "Marked UP" drawings (specifically color coded as red in, green out, blue for comments) per the scope of work. This set shall support the business unit until the final drawings are issued by Contractor.

b. One (1) set of record/As Built drawings in the form of CAD drawings (specifically Microstation or AutoCAD) per the scope of work.

c. One (1) set of PDF formatted copies of the signed final drawing.

d. An Excel database listing all As Built drawings. The database shall be formatted to merge with Company's database.

3. If Contractor has purchased equipment and has processed equipment Supplier documents e.g. drawings and equipment manuals, then the Supplier Documents also must be submitted.

a. The scope of work shall identify what types of Contractor drawings will be assigned Company drawing numbers. Company shall assign drawing numbers as a part of its review pursuant to Paragraph D. After such assignment, all reference to such drawings (including, but not limited to, Supplier manuals) shall use Company's drawing number. Submittal of Supplier drawing shall be as discussed above.

b. Supplier drawings not assigned a Company drawing number shall have Company file numbers assigned (e.g. C1-xxxx) similar to Company drawings. These Supplier drawings shall be submitted not later than the equipment arrival at the Project.

c. Equipment Supplier manuals shall be submitted as follows:

1. The number of sets of hard copies as per the Work Scope (typically 10) shall be delivered to the individual named in the Work Scope.

2. Two (2) sets of a PDF formatted copies via a CD to the individual named in the Work Scope.

D. Unless otherwise specified in the applicable scope of work, Company has no obligation to make final payment until the documents required by A and B above are received.

E. As used herein, "documents" mean any drawings, specifications, technical descriptions, calculations, samples and other similar items, as identified as deliverables under an applicable scope of work prepared by Contractor or by Subcontractors or Suppliers.

F. Unless otherwise specified in the applicable scope of work, Contractor shall submit five (5) copies of the documents unless otherwise requested by Company (up to a maximum of ten (10) copies).

G. The requirement that Contractor submit " Documents for Review" means that before implementing the information contained in the documents, Contractor shall (1) submit copies of the documents required, (2) resolve any questions raised by Company's comments, (3) follow Company's instructions indicated on the documents, and (4) obtain Company's Authorization to Proceed. Documents shall be submitted on or before the dates required in the applicable scope of work. Unless otherwise provided in the applicable scope of work, Company shall complete its review of the documents within ten (10) days of their receipt. Company's review does not mean that a complete design and specification analysis has been or shall be performed. Authorization to Proceed shall not constitute acceptance or approval by Company of design(s), detail(s), calculation(s), analysis(es), test method(s), or material developed or selected. Notwithstanding review by Company and Company's Authorization to Proceed, Contractor remains fully and completely responsible for complying with its obligations hereunder except to the extent Contractor follows Company's instructions pursuant to (3) above.

H. If Company's review is required on an expedited basis to support an applicable Work Scope, then the parties can agree to a review cycle less than ten (10) days.

I. Unless otherwise specified in the applicable scope of work, Company shall return each document submitted by Contractor with appropriate instructions. These instructions and their meanings are as follows:

1. *Proceed.* Contractor is authorized to implement the information contained in this document.

2. *Proceed-Review Not Required.* Contractor is authorized to Proceed. Contractor was not required to submit this document and no review was requested or performed.

3. *Proceed as Noted.* Contractor is authorized to implement the information contained in this document, subject to the incorporation therein of all Company comments.

4. *Revise and Resubmit.* Contractor is not authorized to Proceed. Contractor shall incorporate all Company comments and resubmit the revised document for Company review as though the document had not previously been submitted to Company.

J. To the extent Company comments are necessitated by Contractor's failure to meet the requirements of the Agreement and/or scope of work, such costs associated with the delays and/or changes in the manufacturing and/or schedule resulting from compliance with Company's instructions shall be considered reimbursable costs.

K. All drawings, specifications and other documents furnished by Contractor in connection with this Agreement shall be furnished to Company, are the property of Company, and there shall be no restrictions upon Company's use thereof.

53. LINES, GRADES AND MONUMENTS

A. Unless otherwise specified, all Work shall be done to the lines and grades set forth in the Agreement. Contractor shall complete the layout of all Work and shall be responsible for all measurements that may be necessary or required for the execution of any Work to the locations, lines, and grades specified in the Agreement, except that layout in easements and public rights of way of underground conduit, cable pipe lines and steam lines, and location of overhead poles shall be completed by Company.

B. It may be necessary at times to temporarily interrupt a portion of Contractor's activities in order that Company or its designate may make measurements or surveys without interruptions or other interferences that may impair the accuracy of the results of such measurements or surveys. At any time, upon request by Company, Contractor shall interrupt its activities to such extent as may be necessary for this purpose.

54. SITE CONDITIONS – See CSA Section 6

55. DIFFERING SITE CONDITIONS – See CSA Section 6

56. USE OF COMPANY'S EQUIPMENT, PERSONNEL AND FACILITIES

A. Circumstances may arise where Contractor shall request that Company make available to Contractor certain equipment and/or facilities and operators for the performance of the Work. If Company agrees to such request (which it is under no circumstances obligated to do), the equipment and/or facilities fees shall be charged to Contractor at rates specified by Company and subject to such terms and conditions (which may be in addition to those set forth in this Agreement) as Company may require.

B. Contractor shall assure itself of the condition of such equipment and/or facilities before use and shall assume all risks and responsibilities in its use of the equipment and/or facilities. Contractor shall defend, indemnify and hold Company harmless against any damages or claims that may arise from such use. Before returning such equipment and/or facilities to Company, Contractor shall confirm that no part of the equipment and/or facilities loaned to Contractor has been overstressed or damaged in any way as a result of its use.

C. In the event such equipment is furnished with an operator, it is understood that such operator shall perform the Work under the complete direction and control of Contractor and shall be

considered Contractor's employee for all purposes other than the payment of wages, Worker's Compensation or other benefits provided directly by Company.

57. NETWORK SECURITY/VIRUS PROTECTION

A. If Company's access to Contractor's system or Contractor's access to Company's system requires a network connection between Company's wide area network (WAN) and Contractor's WAN, Contractor and Company shall take reasonable and customary precautions to prevent unauthorized access to or use of the Network Connection through their respective networks. The parties agree, however, that each party is responsible for the security of its own network. Neither party shall be liable to the other for unauthorized access to the network connection, so long as such party shall have taken reasonable and customary precautions to prevent such unauthorized access.

B. Neither Company or Contractor shall knowingly engage in creating or transmitting computer virus software or other programs which could contaminate or otherwise cause the malfunction of any system (i.e., viruses, trojan horses, trap doors, worms, etc.). When providing electronic materials (any electronic media method, including but not limited to diskettes or CDROMs) to Company or Contractor under this Agreement, both parties agree to exercise the same standard of care that it uses to safeguard against the transfer of known computer viruses or other system errors which could contaminate or otherwise cause the malfunction of its own computer system.

58. ELECTRONIC MEDIA TOOL VIRUS PROTECTION

A. Any electronic media tool, including, but not limited to, diskettes, CD-Roms, laptops, or any other form of software or hardware provided or used by Contractor, shall be free from any virus, or any other system error that may contaminate or otherwise cause harm to Company's computer environment. Contractor warrants that any software, and related documentation in electronic form, shall not contain, or result in the creation or insertion of, any disabling device (i.e., any virus, timer, clock, counter, time lock, time bomb, or other limiting design, instruction, or routine) that would erase data or programming, cause any resource to become inoperable or otherwise incapable of being used in the full manner for which such resource was intended to be used, or cause any software or documentation, any portion thereof, or any other programs, hardware, equipment, or data to become inoperable or otherwise become incapable of being used in the full manner for which it was designed, intended, and created.

B. Contractor further warrants that any software and related documentation in electronic form, shall not contain any computer code that would: (i) disable the software or impair its use or operation in any way based on the elapsing of a period of time, the exceeding of an authorized number of copies, users, or other relevant metric, or the advancement to a particular date or other numeral (referred to as "time bombs", "time locks", or "drop dead" devices); (ii) permit Contractor or any third party to remotely, and without Company's knowledge or approval, access the software through a device such as those referred to as a "trap," "access code," or "trap door"; or (iii) permit Contractor or any third party to track, monitor, or otherwise report on the use or operation of such software.

C. If such virus or other contaminant is brought into Company's computer environment, by or through Contractor, Contractor shall reimburse Company for all labor and materials costs incurred by Company to identify, contain and correct the effects of such virus. The hourly rate paid by Contractor for the identification, containment and correction of the effects of such virus shall be at the prevailing hourly rate incurred by Company.

59. RECORDS AND AUDITS

Company or its authorized representative shall have access to Contractor's records at Company's premises or at Contractor's regular place of business during normal business hours to review, audit, and verify any information connected with the performance of this Agreement for a period of three (3) years after completion of the Work. Copies of any material shall be made for Company at its request and any reasonable cost of reproduction shall be borne by Company.

60. NON-WAIVER

None of the provisions of the Agreement shall be considered waived by either party unless such waiver is given in writing by the other party. No such waiver shall be a waiver of any past or future default, breach or modification of any of the terms, provisions, conditions or covenants of the Agreement unless expressly set forth in such waiver.

61. NOTICES

Notices and other written communications shall be sent to Buyer and Contractor's representative identified in the Agreement. Such notices and other written communications must reference the Purchase Order and/or Contract Number appearing in the Agreement.

62. SAVING CLAUSE- INDEPENDENT TERMS

Each term and condition of this Agreement is deemed to have an independent effect and the invalidity of any partial or whole paragraph or section shall not invalidate the remaining paragraphs or sections. The obligation to perform all of the terms and conditions shall remain in effect regardless of the performance of any invalid term by the other party.

63. ASSIGNMENT

No assignment of this Agreement or any of its rights or obligations hereunder shall be made by Contractor without first obtaining the written consent of Company. This Agreement shall be binding upon and shall inure to the benefit of the respective successors and permitted assigns of the parties hereto.

64. GOVERNING LAW AND JURISDICTION

The Agreement, and the rights, obligations and liabilities of the parties hereto shall be construed in accordance with the law of the State of Michigan, without regard to its conflict of law principals.

The parties agree that any action with respect to this Agreement shall be brought in a court of competent subject matter jurisdiction located in the State of Michigan and the parties hereby submit themselves to the exclusive jurisdiction and venue of such court for the purpose of such action.

65. SURVIVAL

All of the terms of this Agreement which by their nature extend beyond (a) the termination or cancellation of this Agreement or (b) the completion of the Work shall survive and remain in full force and effect and apply to respective successors and assigns.

66. NON-EXCLUSIVITY

It is agreed that this Agreement is not exclusive, and that nothing herein shall be deemed to prevent Company from engaging others to perform any of the Work or to prevent Company from performing any of the Services through its own employees or agents.

67. CONSTRUCTION OF TERMS

The terms of this Agreement have been arrived at after mutual negotiation and the parties agree that its terms shall not be construed against any party by reason of the fact that this Agreement was prepared by one of the parties.

Exhibit G – Insurance Requirements as Amended

Appendix A (Rev. 4.22.02)

Insurance to be Provided by the Contractor/Supplier (CONTRACTOR)

Before the CONTRACTOR DOES ANY WORK under the Contract, the CONTRACTOR SHALL FURNISH TO DTE Energy and its subsidiaries CERTIFICATE(S) OF INSURANCE evidencing that insurance has been provided to meet, at minimum, the requirements as set forth in this Appendix. It is expressly understood that the obtaining or maintenance of insurance as is herein required, shall in no way limit or release CONTRACTOR's liability under the indemnification provisions of the agreement or contract for which this insurance is provided. Contractor's subcontractors shall maintain similar insurance as required of Contractor.

Type of Insurance	Minimum Limits and Coverage
1. Workers' Compensation:	Statutory requirements for the State of Michigan and/or for the state where the work will be performed.
2. Employers' Liability:	\$ 1,000,000 each person
3. Business Automobile Policy when applicable (see Section 8.(e) herein). Applies to Owned, Non-Owned and Hired: Combined Single Limit Bodily Injury and Property Damage	\$1,000,000 each occurrence
4. Commercial General Liability (The limits required may be satisfied by a combination of primary and/or excess coverage): Combined Single Limit Bodily Injury and Property Damage	\$5,000,000 each occurrence

AND

CONTRACTOR'S COVERAGE SHALL:

- (i) Include DTE Energy and its subsidiaries as additional insured under the general liability policy. Such additional insured status shall be provided by an endorsement at least as broad as the appropriate Insurance Services Office (ISO) blanket endorsement (See Section 6. herein).
 - (ii) Include a cross liability clause.
 - (iii) Provide that the contractor's workers compensation insurer shall have no rights of recovery, by subrogation or otherwise, against DTE Energy and its subsidiaries.
 - (iv) Include blanket contractual coverage.
 - (v) Include products and/or completed operations coverage until final acceptance of the service or work
 - (vi) Contain no exclusions for explosion, collapse or underground property damage hazards (XCU coverage).
5. Upon execution of the contract, initial certificates of insurance and blanket endorsements are to be provided to the buyer in the supply chain and become a part of the Contract. All Contractor's certificates of insurance

shall state in the Special Provisions section: "DTE Energy and its subsidiaries are listed as additional insureds with respect to the general liability policy and the above listed liability insurance includes blanket contractual coverage". Upon renewal, rewrite or new issue of its insurance coverage, Contractor shall provide to Supply Chain Mgt.all such certificates of insurance and other evidence of coverage to satisfy all of the provisions herein. Such certificates should be sent to Supply Chain Mgt., RE: Contractor Certificate, DTE Energy, 2000 2nd Avenue, 505 WCB, Detroit, MI 48226.

6. In addition to providing certificates of insurance, Contractor shall provide a copy of its blanket additional insured endorsement (see Section 4.(i) herein).

7. Should any of the work:

- (a) Be upon or contiguous to navigable bodies of water or subject to Admiralty jurisdiction, CONTRACTOR shall also carry insurance covering their employees for benefits available and insurance against employer's liabilities under the Federal Longshoremen's and Harbor Workers' Act (44 U.S. Stat. 1424 (as amended)) and under the Jones Act (41 U.S. Stat. 988 (as amended)) or under the General Maritime Law.
- (b) Involve licensed vehicle(s) utilized within the scope of work performed under the Contract, CONTRACTOR shall provide evidence of Automobile Liability Insurance coverage as outlined in Section 3 herein.
- (c) Be within 50 feet of any railroad property, CONTRACTOR shall maintain endorsement to General Liability policy that eliminates the "sidetrack" exclusion.

8. All deductibles or retentions on any of the policies of insurance required herein shall be for the account of the Contractor.